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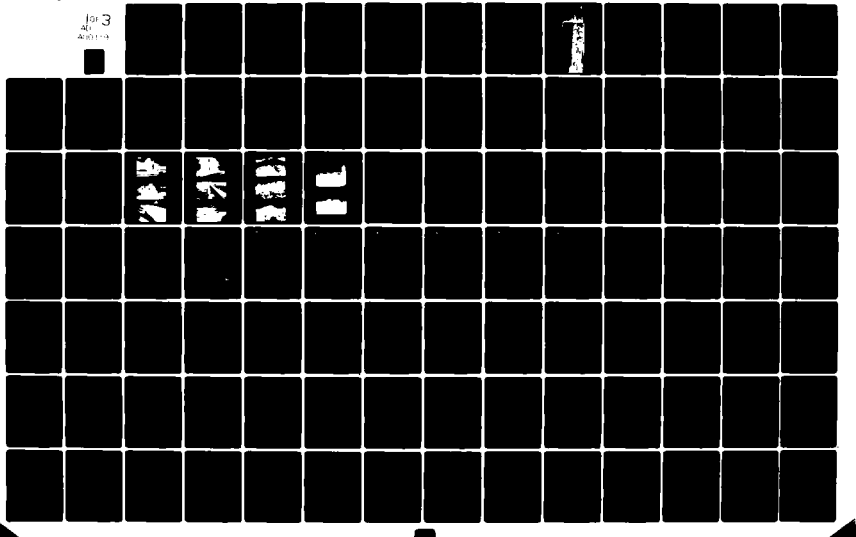

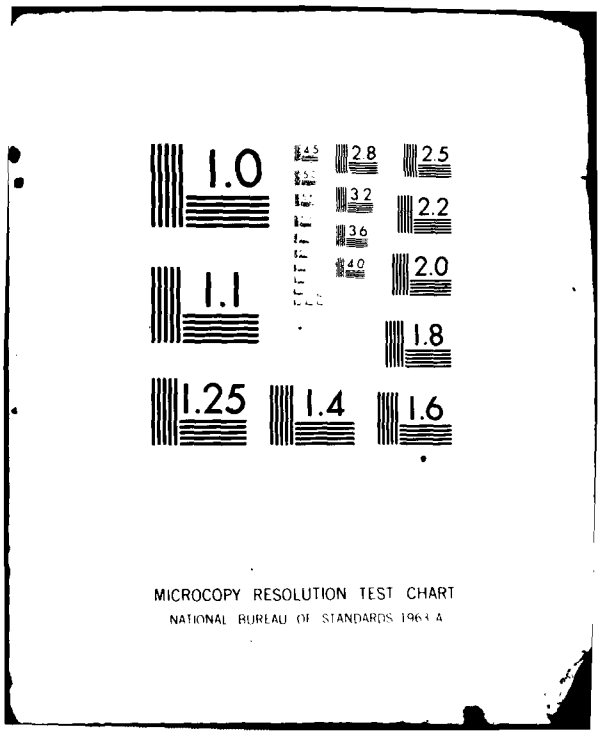
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REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) East Canada Lake Dam Mohawk River Basin Herkimer County, NY Inventory No. NY00201	5. TYPE OF REPORT & PERIOD COVERED Phase I Inspection Report National Dam Safety Program 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) JOHN B. STETSON	8. CONTRACT OR GRANT NUMBER(s) DACW51-81-C-0009
9. PERFORMING ORGANIZATION NAME AND ADDRESS Stetson-Dale 185 Genesee Street Utica, New York 13501	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Department of the Army 26 Federal Plaza New York District, CofE New York, New York 10287	12. REPORT DATE 10 September 1981 13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) Department of the Army 26 Federal Plaza New York District, CofE New York, NY 10287	15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

LEVEL II

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; Distribution unlimited.

DTIC JAN 5 1982 E

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dam Safety
National Dam Safety Program
Visual Inspection
Hydrology, Structural Stability
East Canada Lake Dam
Herkimer
Mohawk River Basin

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

The examination of documents and visual inspection of the East Canada Lake Dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies which require remedial work.

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The hydrologic/hydraulic analysis indicates that the dam will be overtopped by flows in excess of 48 percent of the Probable Maximum Flood (PMF). The dam will be overtopped by 4.9 feet and 0.09 feet by the PMF and 1/2 PMF respectively. Failure of the dam during the 1/2 PMF event would significantly increase the downstream hazard from that which would exist just prior to failure of the dam. The spillway capacity, therefore, is assessed as "seriously inadequate" and the dam is assessed as unsafe, non-emergency.

The classification of "unsafe" applied to a dam because of a "seriously inadequate spillway" is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean, however, that based on an initial screening and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam would take place, significantly increasing the hazard to loss of life downstream from the dam.

It is, therefore, recommended that within 3 months of notification to the Owner a detailed hydrologic/hydraulic investigation of the structure should be undertaken to more accurately determine the site specific characteristics of the watershed and their effect upon the overtopping potential of the dam. The results of these investigations will determine the appropriate remedial measures which will be required to achieve adequate spillway capacity. The remedial measures should be completed within 18 months. In the interim, a detailed emergency action plan must be developed and implemented during periods of unusually heavy precipitation. Also, around-the-clock surveillance of the structure must be provided during these periods.

The structural analysis for the concrete spillway section indicates satisfactory stability for all loading conditions investigated.

MOHAWK RIVER BASIN

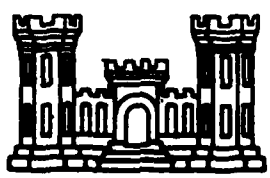
EAST CANADA LAKE DAM

NEW YORK

INVENTORY No. NY 201

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM



NEW YORK DISTRICT CORPS OF ENGINEERS

AUGUST 1981

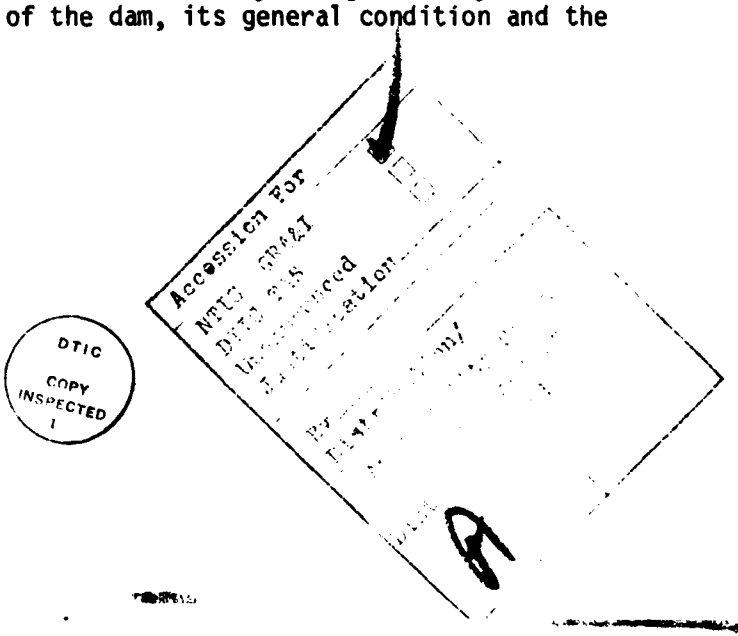
PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.



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APPENDIX

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam:	East Canada Lake Dam (Beardslee) I.D. NY 201
State Located:	New York
County:	Herkimer and Montgomery
Watershed:	Mohawk River Basin
Stream:	East Canada Creek
Date of Inspection:	May 8, 1981

ASSESSMENT OF GENERAL CONDITIONS

The examination of documents and visual inspection of the East Canada Lake Dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies which require remedial work.

The hydrologic/hydraulic analysis indicates that the dam will be overtopped by flows in excess of 48 percent of the Probable Maximum Flood (PMF). The dam will be overtopped by 4.9 feet and 0.09 feet by the PMF and 1/2 PMF respectively. Failure of the dam during the 1/2 PMF event would significantly increase the downstream hazard from that which would exist just prior to failure of the dam. The spillway capacity, therefore, is assessed as "seriously inadequate" and the dam is assessed as unafe, non-emergency.

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It is, therefore, recommended that within 3 months of notification to the Owner a detailed hydrologic/hydraulic investigation of the structure should be undertaken to more accurately determine the site specific characteristics of the watershed and their effect upon the overtopping potential of the dam. The results of these investigations will determine the appropriate remedial measures which will be required to achieve adequate spillway capacity. The remedial measures should be completed within 18 months. In the interim, a detailed emergency action plan must be developed and implemented during periods of unusually heavy precipitation. Also, around-the-clock surveillance of the structure must be provided during these periods.

The structural analysis for the concrete spillway section indicates satisfactory stability for all loading conditions investigated.

The following remedial work should be completed within one year.

1. Trees and brush should be removed from the slopes of the embankment and a suitable sod cover re-established to allow for inspection of the facility.

2. Woodchucks should be eliminated from the facility and burrows filled.

3. Deteriorated concrete and gunite on the spillway section and at the toe of the spillway should be repaired.

4. A formalized inspection system should be initiated to develop data on the conditions and maintenance operation at the facility.

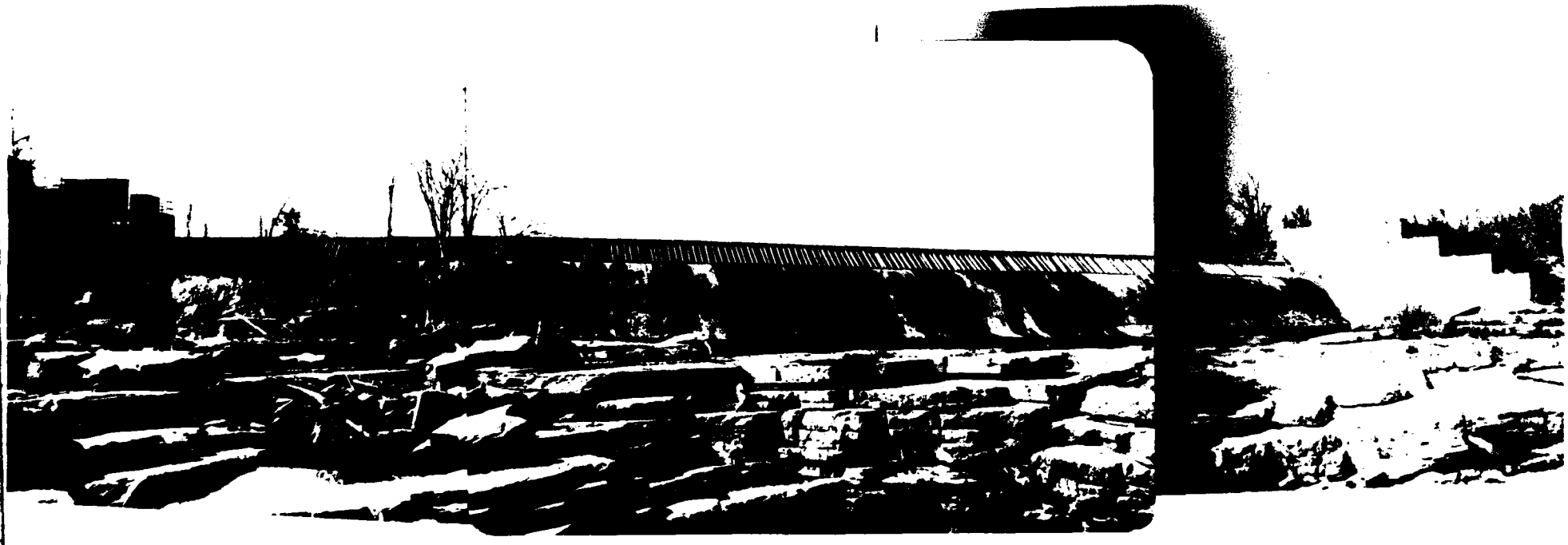
5. A flood warning and emergency evacuation system should be implemented to alert the public in the event that conditions occur which could result in failure of the dam.

Dale Engineering Company

John B. Stetson, President

Approved By: for Col. W. M. Smith, Jr.
Date: New York District Engineer

10 SEP 1981



1. OVERVIEW OF THE EAST CANADA LAKE DAM (BEARDSLEE FALLS DAM)

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
EAST CANADA LAKE DAM (BEARDSLEE) I.D. NO. NY 201
MOHAWK RIVER BASIN
HERKIMER AND MONTGOMERY COUNTIES, NY

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority

Authority for this report is provided by the National Dam Inspection Act, Public Law 92-367 of 1972. It has been prepared in accordance with a contract for professional services between Dale Engineering Company and the U.S. Army Corps of Engineers.

b. Purpose of Inspection

The purpose of this inspection is to evaluate the existing condition of the East Canada Lake Dam and appurtenant structures, owned by the Niagara Mohawk Power Corporation, and to determine if the dam constitutes a hazard to human life or property and to transmit findings to the U.S. Army Corps of Engineers.

This Phase I inspection report does not relieve an Owner or Operator of a dam of the legal duties, obligations or liabilities associated with the ownership or operation of the dam. In addition, due to the limited scope of services for these Phase I investigations, the investigators had to rely upon the data furnished to them. Therefore, this investigation is limited to visual inspection, review of data prepared by others, and simplified hydrologic, hydraulic and structural stability evaluations where appropriate. The investigators do not assume responsibility for defects or deficiencies in the dam or in the data provided.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

The East Canada Lake Dam is an earthfilled structure consisting of two separate sections combined with a concrete gravity spillway section. The facility is used to impound water for hydro-electric generating purposes. The inlet for the penstock to the power generating station is located on the right abutment of the dam. Flow into the penstock is controlled through two 10-1/2 foot square sluice gates. Just to the left of the penstock gates is located a 20 foot wide x 11 foot high tainter gate which is used to control levels in the impoundment. The concrete gravity spillway extends for a length of 273 feet to the left of the tainter gate structure. This spillway consists of an ogee shaped concrete structure with concrete abutment walls. The maximum height of the spillway section

is approximately 18-1/2 feet. The spillway is normally equipped with flashboards which extend 7 feet above the spillway crest.

The left abutment of the spillway terminates in an earthfilled section. This section, 276 feet long, was constructed over an existing timber crib dam which was located in the mainstream channel of East Canada Creek. The dam reaches its maximum height of approximately 65 feet in this area. The dam section in this area consists of a clay puddle core with an earthen shell on both the upstream and downstream face. According to available plans, the upstream slope varies from 1.3 horizontal to 1 vertical to 2.5:1 (horizontal to vertical) and the downstream face varies from 1.4 to 1 to 2.5:1 (horizontal to vertical) for an effective slope of about 2:1. The remaining 463 feet of the embankment section to the left abutment similarly consists of a clay puddle core with earthen shell.

b. Location

The East Canada Lake Dam is located in the Town of Manheim, Herkimer County, and the Town of St. Johnsville, Montgomery County, New York. The facility is located approximately 1-1/2 miles north of New York Route 5.

c. Size Classification

The maximum height of the dam is approximately 65 feet. The volume of the impoundment is approximately 5,865 acre feet to the top of dam. Therefore, the dam is in the large size classification as defined by the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

Residential properties along Route 5 are situated near the bank of East Canada Creek. The power generating station served by the facility is situated approximately 2,000 feet downstream. The mainline track of Conrail is located approximately 1-3/4 miles downstream. Therefore, the dam is in the high hazard category as defined by the Recommended Guidelines for Safety Inspection of Dams.

e. Ownership

The dam is owned by the Niagara Mohawk Power Corporation.

Contact: Niagara Mohawk Corporation
300 Erie Boulevard West
Syracuse, NY 13202
Engineer: Robert J. Levett
Telephone: (315) 474-1511

f. Purpose of the Dam

The dam is used for power generating purposes.

g. Design and Construction History

The East Canada Lake Dam (Beardslee) was constructed in 1924. A timber crib dam previously existed at the site. This dam was constructed during the period of 1892 to 1898. Plans for the 1924 construction are included in Appendix G. These plans substantially conform to the present configuration of the facility. No information is available regarding the design or construction history of this facility.

h. Normal Operational Procedures

The facility is used to store water for power generating purposes. The level in the impoundment is maintained to provide optimum efficiency in power generation.

The facility is inspected regularly by representatives of Niagara Mohawk Power Corporation.

1.3 PERTINENT DATA

a. Drainage area

The drainage area of the Beardslee Falls Dam is 288 square miles.

b. Discharge at Dam Site

The maximum recorded discharge at USGS gage number 01348000 was 24,000 cfs on 10-2-1945. The gage is located 3,000 feet downstream of the dam.

Computed discharges:

Ungated service spillway, top of dam		51,230 cfs
Gated drawdown -		
penstock:		1,200 cfs
tainter gate:	reservoir @ top of dam	4,910 cfs
	reservoir @ spillway crest	450 cfs

c. Elevation (feet above MSL)

Top of dam	508.0 ft.
Spillway crest	491.5 ft.
Stream bed at centerline of dam	443.0 ft.

d. Reservoir

Length of maximum pool	10,200 ft. (1/2 PMF)
Length of normal pool	7,600 ft.

e. Storage

Top of dam	5,865 acre ft.
Spillway pool	2,490 acre ft.

f. Reservoir Area

Top of dam	260 acres
Spillway pool	145 acres

g. Dam

Type - earth shell with reinforced concrete core and clay puddle core
Length - 900 feet
Height - 65 feet
Freeboard between normal reservoir and top of dam - 16.5 feet
Top width - 56 feet (plans)
Side slopes- Upstream: Variable, 1.3:1 to 2.5:1 (horizontal to vertical)
Downstream: Variable, 1.4:1 to 2.5:1 for an approximate 2:1 effective slope
Zoning - clay puddle core with random earth shell
Impervious core - reinforced cut-off wall with hydraulic puddle core
Grout Curtain - None

h. Spillway

Type - Uncontrolled, ogee shaped downstream face
Length - 273 ft.
Crest elevation - 491.5
Flashboards - 5 feet high (existing)
7 feet high (future)
Gates - None
U/S Channel - Reservoir
D/S Channel - Natural creek, rock bottom and sides

i. Regulating Outlets

One 12 foot diameter pipe leading to a 13 foot diameter penstock. One 20 foot wide x 11 foot high tainter gate.

SECTION 2: ENGINEERING DATA

2.1 GEOTECHNICAL DATA

a. Geology

Geologically, Beardslee Falls is located in the Mohawk section of the Appalachian Plateaus Province which is part of the Appalachian Highlands, the major physiographic division. The Adirondack Province is to the north. The region had been subjected to glacial activity, scouring and deposition.

Bedrock, at the site area, is the Sugar River Limestone, a formation within the Trenton Group of limestones of Medial Ordovician Age. The formation is dominantly a light, medium-gray calcarenite with interbedded thin calcareous shales. Mudcracks and worm borings are common.

b. Subsurface Investigations

The plans included in Appendix G show the location of the rock surface in the area. No other information is available regarding subsurface conditions at this site.

2.2 DESIGN RECORDS

No reports were available from the original design of the dam.

2.3 CONSTRUCTION RECORDS

No information was available concerning the original construction.

2.4 OPERATIONAL RECORDS

There are no operational records available for this dam.

2.5 EVALUATION OF DATA

The data presented in this report was obtained from the Niagara Mohawk Power Corporation and from the files of the New York State Department of Environmental Conservation, Dam Safety Section. The information available appears to be reliable and adequate for a Phase I inspection report.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

The East Canada Lake Dam (Beardslee) was inspected on May 8, 1981. The Dale Engineering Company inspection team was accompanied on the inspection by Robert Levett of the Niagara Mohawk Power Corporation. During the inspection, the weather was fair. Water level in the impoundment was approximately elevation 494.3, and approximately 2.8 feet above the crest elevation. At the time of the inspection, 5 feet of flashboards were in place on the crest of the dam.

b. Dam

The earthfilled sections of the facility were heavily overgrown with trees and brush so as to partially obscure the surface from view. The crest of the dam was uniform in elevation with no indications of depressions or subsidence. The water level in the impoundment precluded examination of the upstream slope below the water level. Stone protection at the water line remains in good condition and provides adequate protection to the slope. The downstream slope of the embankment was inspected and appears to be of uniform slope with no depressions or subsidence detected in the field. No evidence of seepage was detected on the downstream slope or beyond the toe of the embankment.

The downstream slope of the earth embankment section which was constructed over the old timber crib dam is covered with a rock fill. The old stream channel at the toe of slope presently impounds water. This area is strewn with dead trees and debris. No evidence was detected that indicated seepage as a source of this water.

c. Spillway

The spillway section of the dam has been resurfaced with gunite concrete. This material is deteriorating so that wire mesh is visible at many of the vertical joints and the gunite covering has completely deteriorated in an area approximately 40 feet long, exposing the spalled concrete surface of the original spillway. Some undermining of the gunite material is also evident at the toe of the spillway section. The spillway remains in uniform alignment with no evidence of structural displacement evident in the field.

During the inspection, flashboards were in place to a height of approximately 5 feet above the spillway crest. Representatives of Niagara Mohawk Power Corporation indicated that the elevation soon would be increased to a height of 7 feet above the spillway.

d. Appurtenant Structures

The tainter gate and sluice gates controlling flow from the impoundment were found to be in operating condition and adequately maintained. Niagara Mohawk Power Corporation operates these facilities periodically.

e. Reservoir Area

The slopes of the reservoir are relatively gentle and show no signs of recent erosion. No areas of known slope instability are known to exist in the reservoir area.

3.2 EVALUATION

The visual inspection revealed several deficiencies on this structure. The following items were noted:

1. Both the crest and the downstream slope of the earthfill section of the dam are heavily overgrown with trees and brush.

2. Woodchuck burrows were detected in the downstream slope of the dam

3. The concrete gunite surface of the spillway section is heavily deteriorated.

4. The concrete and rock materials comprising the foundation zone of the toe of the spillway are deteriorated.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

The facility is regularly inspected by representatives of the Niagara Mohawk Power Corporation. The concrete sections have been maintained in the past. The water level in the impoundment is maintained to provide optimum efficiency for power generation.

4.2 MAINTENANCE OF THE DAM

Maintenance and operation of the dam is controlled by Niagara Mohawk Power Corporation. Conditions at the site indicate that the concrete surfaces have been maintained in the past, but that further maintenance is required due to deterioration of the gunite surfaces. No formalized inspection system is in effect at the facility.

4.3 MAINTENANCE OF OPERATING FACILITIES

The gates controlling flow into the penstock are in operating condition and well maintained. The tainter gate which controls the level of the impoundment during high run-off situations is similarly in operating condition.

4.4 DESCRIPTION OF WARNING SYSTEM

No warning system is in effect at present.

4.5 EVALUATION

The dam is regularly inspected and maintained by the Owner. A flood warning and emergency evacuation system should be implemented to alert the public should conditions occur which could result in failure of the dam. A formal inspection procedure should be implemented and records maintained so that changing conditions at the site could be readily identified.

SECTION 5: HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

The East Canada Lake Dam (Beardslee Falls) is used for hydroelectric power and is located in the southeast portion of Herkimer County. The dam is situated on East Canada Creek approximately 1.2 miles upstream of its confluence with the Mohawk River. Upstream of the dam site, East Canada Creek has a drainage area of approximately 288 square miles which is characterized by mostly wooded and agricultural areas. The dam creates a pool with a surface area of approximately 200 acres at the top of flashboards used in the summer.

5.2 ANALYSIS CRITERIA

The purpose of this investigation is to evaluate the dam and spillway with respect to their flood control potential and adequacy. This has been assessed through the evaluation of the Probable Maximum Flood (PMF) for the watershed and the subsequent routing of the flood through the reservoir and the dam's spillway system. The PMF event is that hypothetical flow induced by the most critical combination of precipitation, minimum infiltration loss and concentration of run-off of a specific location that is considered reasonably possible for a particular drainage area.

The hydrologic analysis was performed using the unit hydrograph method to develop the flood hydrograph. Due to the limited scope of this Phase I investigation, certain assumptions based on experience and existing data were used in this analysis and in the determination of the dam's spillway capacity to pass the PMF. In the event that the dam could not pass 1/2 the Probable Maximum Flood without overtopping, additional analyses are to be performed on potential dam failures if the dam is designated as a High Hazard Classification. This process was done with the concept that, if the dam was unable to satisfy this criteria, further refined hydrologic investigations would be required.

The U.S. Army Corps of Engineers' Hydrologic Engineering Center's Computer Program HEC-1 DB using the Modified Puls Method of flood routing was used to evaluate the dam, spillway capacity and downstream hazard.

An HEC-1 computer model for the Mohawk River Basin was published by the New York District Corps of Engineers in a report entitled Upper Hudson and Mohawk River Basins Hydrologic Flood Routing Models, dated October 1976 (Ref. 19). This report was reviewed for the purpose of this investigation and the unit hydrograph parameters presented in that study were adopted for the HEC-1 model developed for this investigation. These hydrograph parameters were determined by regression analysis as part of the Upper Hudson study. The drainage area above East Canada Lake was included in the Upper Hudson and Mohawk River Basin model and was analyzed utilizing two sub-areas. For this investigation, the drainage area was divided into eight sub-areas to model the variability in hydrologic characteristics within the drainage basin. Run-off, routing and flood hydrograph combining was then performed to obtain the flow into the reservoir.

In this analysis, the reservoir pool was assumed to be at the top of flashboards at the start of the storm and outflow through the penstock was assumed to be zero. The flashboards are assumed to fail under flood conditions. For the purposes of this analysis, half of the flashboards were assumed to fail under 2.5 feet of overtopping while the rest were assumed to have failed under 3.5 feet of overtopping. Considering the operating condition of the tainter gate, outflow through this structure was also considered in the analysis. The tainter gate opening was assumed to vary with the accompanying flood heights. The tainter gate was assumed to be opened a third of the way when the flashboards become overtopped by a half a foot and opened a third more for each 3 foot increase in flood height in two equal increments.

The Probable Maximum Precipitation (PMP) was 18.9 inches according to Hydrometeorological Report (HMR #33) for a 24-hour duration storm, 200 square mile basin. The loss rates used in the PMF analysis were those used in the Transposed Agnes Storm and SPF Analysis published in the Upper Hudson and Mohawk River Basins report. These loss rates incorporated an initial loss of 1.0 inches and a continuous loss rate of 0.075 inches/hour. These assumptions yielded 84 percent runoff from the PMF. The peak for the PMF inflow hydrograph was 117,278 cfs and the 1/2 PMF inflow peak was 58,106 cfs. The storage capacity of the reservoir reduced these peak flows a negligible amount to 117,190 cfs for the PMF and 57,772 for the 1/2 PMF.

5.3 SPILLWAY CAPACITY

The spillway is an uncontrolled ogee shaped weir 273 feet in length with a discharge capacity of 51,230 cfs at the top of dam elevation, assuming failure of the flashboards. The tainter gate system is in operating condition and could give an additional discharge capacity of 4,910 cfs at the top of dam elevation, resulting in a total spillway system discharge capacity of 56,140 cfs.

SPILLWAY SYSTEM CAPACITY

FLOOD	PEAK DISCHARGE	CAPACITY AS % OF FLOOD DISCHARGE
PMF	117,190 cfs	48%
1/2 PMF	57,772 cfs	97%

5.4 RESERVOIR CAPACITY

The reservoir storage capacity was estimated from the area-capacity curve by Adirondack Power & Light Corporation dated February 2, 1925 (see Appendix C) and available riverbed information at the Beardslee Falls Dam.

The resulting estimates of the reservoir storage capacity are shown below:

Top of Dam	5,865 acre feet
Spillway Crest	2,490 acre feet

5.5 FLOODS OF RECORD

The maximum recorded discharge at USGS gage number 01348000 in East Creek, New York, was 24,000 cfs on October 2, 1945 (Ref. 20, 21). The gage is located 3,000 feet downstream of the dam site and has a drainage area of 291 square miles, whereas the East Canada Lake Dam has a drainage area of 288 square miles. The period of record for this gage is 1945 to present.

5.6 OVERTOPPING POTENTIAL

The HEC-1 DB analysis indicates that the dam will be overtopped by floods in excess of 48 percent of the PMF as follows:

FLOOD	PEAK INFLOW	PEAK OUTFLOW	MAXIMUM DEPTH OVER DAM
PMF	117,278 cfs	117,190 cfs	4.9 feet
1/2 PMF	58,106 cfs	57,772 cfs	0.09 feet

A dam break analysis was performed to determine the significance of various dam failures on the downstream hazard. This analysis was performed with the 1/2 PMF assuming the earthen embankment to fail at the maximum elevation resulting from the 1/2 PMF. The various scenarios of dam failure investigated covered a range of both breach sizes and failure times to develop the full breach. The flood elevations, due to various dam failures, and the flood elevations that would exist just before the corresponding dam break induced flood wave are shown below. These flood elevations are compared at the downstream hazard area, just before the creek reaches Route 5.

Bottom Width of Breach	Failure Time	FLOOD ELEVATIONS AT DOWNSTREAM HAZARD: Just Prior to Dam Break	FLOOD ELEVATIONS AT DOWNSTREAM HAZARD: Due to Dam Break
50 ft.	0.5 hrs.	331.6	338.4
50 ft.	2 hrs.	331.6	334.8
50 ft.	5 hrs.	331.6	333.1
130 ft.	0.5 hrs.	331.6	342.3
130 ft.	2 hrs.	331.6	337.2
130 ft.	5 hrs.	331.6	333.8
260 ft.	0.5 hrs.	331.6	346.4
260 ft.	2 hrs.	331.6	337.7
260 ft.	5 hrs.	331.6	334.3

The above elevations were estimated from USGS quad sheets. These elevations are not exact and their significance is in the difference between the elevations for the flood levels with and without the dam failure. This analysis indicates that the flood heights would be increased from a flood height of 15.6 feet before the dam failure to a range of 17 to 30 feet due to the dam failure, depending on the particular parameters of the

failure. A few residences in this area appear to be sited between the approximate elevations of 330 to 340. Therefore, this flood depth increase could significantly increase the hazard to loss of life due to a dam failure under this condition. Also, the Route 5 bridge spanning the creek could be jeopardized by a dam failure.

5.7 EVALUATION

Hydrologic/hydraulic analysis performed in accordance with the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams indicates that the earthen embankment will be overtopped by flood flows in excess of 48 percent of the Probable Maximum Flood (PMF). The earthen embankment will be overtopped by 4.9 feet and 0.09 feet by the PMF and 1/2 PMF, respectively. A dam break analysis indicates that failure of the dam under the 1/2 PMF will increase the downstream flood levels on the order of 1.5 to 15 feet, depending on the particular scenario of the dam failure. Failure of the dam during the 1/2 PMF event would significantly increase the downstream hazard from that which would exist just prior to failure of the dam. The spillway capacity, therefore, is assessed as "seriously inadequate" and the dam is assessed as unsafe, non-emergency.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

The Beardslee Falls Dam structure, constructed to impound water for the generation of hydroelectric power, consists of an earthen embankment (dam) section and a concrete spillway section. The dam extends in an approximately east-west direction, with the reservoir impounded against the north side. The ogee-shaped spillway forms the westerly-most segment of the dam. A tainter gate and headgate house comprise part of the right (westerly) abutment of the spillway. A penstock running from the headgate house to a surge tank some distance downstream of the dam is located along the west bank. This penstock has much of its cross-section situated above the area's original ground surface, but is covered with a limited thickness of earth, presumably to provide protection for the penstock material.

At the time of the inspection, flashboards were in place on the spillway and the reservoir level was below the top of these flashboards. The downstream face of the spillway and the abutments were examined "in the dry." The spillway appears to be founded on rock and the surface of the downstream apron area is exposed bedrock. The rock beneath the toe in the area near the left abutment is weathered, but no signs of underdam seepage were noted. No indications of structural instability were revealed by the inspection observations, such as structural cracking or signs of structural movement. Some surface cracking and spalling were noted as having occurred in the abutments and west training wall. The surface of parts of the spillway's downstream face has noticeably deteriorated. This facing apparently is a gunite or shotcrete surface applied subsequent to the original construction.

Generally, the crest area and downstream slope of the earthern embankment section of the dam structure is heavily overgrown with brush and trees. The brush cover interferes with observations important to judging certain structural aspects of the dam, such as alignment. However, of observations possible, no indication of embankment movements or sloughing, nor indications of seepage, were noted. Some small animal burrows were observed in the embankment. A segment of the downstream slope, near the spillway, has been provided with a cover of crushed rock. The need for this crushed rock cover was not apparent, as there were no indications of sloughing or seepage in this zone of the embankment.

b. Design and Construction Data

Design drawings dated 1924 indicate the plan alignment, elevation sections and cross-sections for the original construction. Copies of these plans, by Viele, Blackwell and Buck, New York, New York, are included in Appendix G. The plans show the earthern embankment section of the dam structure to be about 740 feet in length with a maximum height of 60 feet; the concrete spillway and tainter gate structure is approximately 300 feet

in length with a maximum height of about 35 feet. The earthen embankment dam section is provided with a stub concrete cut-off wall which extends 2 feet into the site's bedrock and 5 feet vertically into the constructed embankment. The plans also show that a hydraulically placed puddle core comprises the center section of the embankment. During construction, a timber and earth crib approximately 175 feet long and some 35 to 40 feet high was established across the location of the site's original creek bed near the present center of the dam. This crib apparently was covered with rockfill for additional stability before being incorporated into the downstream zone of the finished earth embankment section of the dam.

No stability analysis, or information on the strength properties of the foundation and dam materials, are indicated on the design plans.

Studies performed in 1967 by the engineering firm of Uhl, Hall and Rich to evaluate stability for the condition when the dam impounds the normal reservoir pool have been made available. For the normal pool and normal pool plus seismic effects cases, the analysis indicated adequate stability for the spillway section and the embankment section.

c. Operating Records

No operating records for this facility have been made available.

d. Post Construction Changes

There is no field evidence or other information available to indicate significant post-construction structural changes to the dam structure. Post-construction work undertaken to maintain the original structure has been performed, however, including the spillway face resurfacing and the installation of the crushed rock slope protection, discussed in (a) above.

e. Seismic Stability

The bedding of the rock is essentially close to horizontal as seen at the dam toe. Bedding thicknesses range from 1-1/2 to 10 inches with an average of 6-8 inches. Minor warping is present. On the right-hand downstream side, folding is obvious. Cameron (1969) considers the warping to be due to differential compaction over clays. More likely, the folding is related to the faulting which had occurred in the immediate area.

Joints are common throughout the downstream exposures. The joint trends and their spacing are as follows:

Strike	Dip	Spacing
N60E	about vertical	5-16 inches
N72W	about vertical	12 inches
N25E	about vertical	28-39 inches
N35W	about vertical	10 feet

The trends of these joint systems suggest that some are probably due to shear. A number of large faults are known to exist in the vicinity of the dam, the closest being less than one-quarter mile southeast of the dam. The reservoir site is located on a horst, an uplifted fault block. The dam is close to the eastern fault of the horst. The western fault, bounding the horst, is about 2 miles west of the dam.

The area is located within Zone 2 of the Seismic Probability Map. Earthquakes on record for the area are tabulated below:

Date	Intensity Modified Mercalli	Location Relative to Dam
1840	V-VI	13 miles W
1933	IV	2 miles SE
1952	V	12 miles E

6.2 STRUCTURAL STABILITY ANALYSIS

Plans included in Appendix G show the plan alignment and cross-section for the dam, but do not include specific engineering information on the properties of the dam and foundation material, nor stability analysis. Studies performed in 1967 evaluated the stability of the spillway and earthern embankment for the reservoir at a normal operations level (Appendix F). As part of the present study, stability evaluations have been performed for the dam's spillway section. Actual properties of the dam's construction materials and foundations were not determined as part of this study; where information on properties was necessary for computations, but lacking, assumptions felt to be practical were made. The stability computations assumed a structural cross-section based on dimensions indicated in the plans included in this report. It should be considered that, in areas where deterioration has occurred, the section dimensions would be less than indicated by the plans with some adverse effect on the structural strength and stability. The analysis also assumed the dam section to be monolithic possessing necessary internal resistance to shear and bending stresses which develop as a result of loadings.

The results of the stability computations indicate satisfactory stability for the spillway section against overturning and sliding effects for the cases of: (i) the reservoir elevation at the normal summertime pool level, (ii) the reservoir at the 1/2 PMF level, (iii) the normal spillway pool with winter ice effects, and (iv) the normal summer pool with seismic effects. The stability computations are presented in Appendix E and the results of these computations are summarized in the table on the next page.

For the PMF conditions, the analysis indicates a slightly inadequate stability against overturning when evaluated by the criteria suggested by the Recommended Guidelines for Safety Inspection of Dams (i.e., where the resultant of the forces acting on the dam is located outside the middle third of the base, tensile stresses would develop in the dam section, a

RESULTS OF STABILITY COMPUTATIONS

	Loading Condition	Factor of Safety* Overturning	Factor of Safety* Sliding**	Location of Resultant Passing through Base***
(1)	Water level at top of flashboards elevation, uplift on base (no ice)	1.76	11.7	0.41b
(2)	Water level at spillway elevation, uplift on base plus 7.5 kips per lineal foot ice load	1.69	13.1	0.39b
(3)	Water levels against upstream face and downstream face based on 1/2 PMF elevations, uplift same as Case 1	1.58	7.8	0.35b
(4)	Water level against upstream face and downstream face based on PMF elevations, uplift same as Case 1	1.48	6.7	0.31b
(5)	Water level at top of flashboards elevation, uplift on base, seismic effects applicable to Zone 2	1.60	9.7	0.37b

* These factors of safety indicate the ratio of moments resisting overturning to those moments causing overturning, and the ratio of forces resisting sliding to those causing sliding. Upstream and downstream water levels were obtained from hydrologic/hydraulic analysis.

** As determined applying the shear-friction method.

*** Indicated in terms of dam's base dimension, b, measured from the toe of the dam.

a condition which is structurally undesirable). However, a somewhat conservative analysis criteria has been applied in this analysis, the effect being that the true resistance against overturning should be slightly greater than computed. The spillway section analyzed is the tallest (most severe) section with no benefit given to integration with the adjacent shorter, more stable zones of spillway. Also, some tensile strength can develop in a concrete base section while some bond to resist tensile effects can also develop between a concrete base and the foundation rock. In considering these practical factors, it is felt that for the PMF condition the spillway possesses a marginal but adequate factor of safety against overturning.

Critical to the analysis and resulting indication of stability are the items of uplift water pressure acting on the base of the dam and the relative permeability of the site's foundation rock. For the "normal operating conditions" case, the analysis uplift force was based on full headwater hydrostatic pressure acting on the dam's upstream corner and a zero tailwater hydrostatic pressure acting on the dam's downstream corner. Uplift pressures were assumed to vary linearly between the dam's upstream and downstream corners and to act upon 100 percent of the dam base.

Uplift as computed for the normal operating condition was also assigned to the flood conditions studied, assuming that uplift pressures would not increase significantly over a relatively short flood stage time period because of an expected low foundation rock permeability.

The earthen embankment section of the dam structure appears to be in stable condition with no requirement for remedial structural work.

Although the field inspection and stability studies indicate the dam to be structurally adequate when subjected to the loading cases studied, the inspection also indicates that a need for maintenance exists. Deteriorated surfaces across the spillway section should be rebuilt to the original dimensions with new concrete. Deteriorating concrete and rock materials comprising the foundation zone at the toe of the spillway should also be rebuilt. Trees and heavy brush should be removed from the crest area and downstream face of the embankment section to: prevent the possibility of trees being uprooted during a storm/flood occurrence and leading to embankment washout, to enable erosion resistant grasses and low brush to thrive, but, importantly, to provide an embankment face and downstream toe area which is easily accessible so that signs of seepage or other occurrences which could be indicating the need for structural correction are detected during normal maintenance inspections. The general area of the embankment which has received the crushed rock cover is a location which should be singled out for such sentinel inspections.

SECTION 7: ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety

The Phase I Inspection of the East Canada Lake Dam (Beardslee) did not indicate conditions which would constitute an immediate hazard to human life or property.

The stability analysis indicates satisfactory stability for all loading conditions investigated.

The hydrologic/hydraulic analysis indicates that the dam will be overtopped by flood flows in excess of 48 percent of the Probable Maximum Flood (PMF). The dam will be overtopped by 4.9 feet and 0.09 feet by the PMF and 1/2 PMF, respectively. Failure of the dam during the 1/2 PMF event would significantly increase the downstream hazard from that which would exist just prior to failure of the dam. The spillway capacity, therefore, is assessed as seriously inadequate and the dam is assessed as unsafe, non-emergency.

The following specific safety assessment is based on the Phase I visual examination, analysis of hydrology/hydraulics and structural stability analysis.

1. Both the crest and the downstream slope of the earthfill section of the dam are heavily overgrown with trees and brush.

2. Woodchuck burrows were detected in the downstream slope of the dam.

3. The concrete gunite surface of the spillway section is heavily deteriorated.

4. The concrete and rock materials comprising the foundation zone of the toe of the spillway are deteriorated.

5. No formal inspection program is in effect at the facility.

6. No warning system is in effect to alert the public should conditions occur which could result in failure of the dam.

b. Adequacy Information

The information available is adequate for this Phase I investigation.

c. Urgency

The Owner should immediately implement a program of surveillance during heavy run-off conditions. Within three months, a flood warning and emergency evacuation plan should be implemented. The remaining items set forth in the safety assessment should be addressed by the Owner, and

appropriate improvements and repairs should be performed within one year of this modification. The recommended investigations should begin within three months. Remedial work determined by the investigations should be completed within 18 months.

d. Need for Additional Investigation

A detailed hydrologic/hydraulic investigation should be undertaken to determine the specific site characteristics of the watershed and their effect upon the overtopping potential of the dam. The results of these investigations will determine the appropriate remedial measures which will be required to achieve adequate spillway capacity. The remedial measures should be completed within 18 months. In the interim, a detailed emergency action plan must be developed and implemented during periods of unusally heavy precipitation. Also, around-the-clock surveillance of the structure must be provided during these periods.

7.2 RECOMMENDED MEASURES

The following is a list of recommended measures to be undertaken to insure safety of this facility.

1. Trees and brush should be removed from the slopes of the embankment and a suitable sod cover re-established to allow for inspection of the facility.

2. Woodchucks should be eliminated from the facility and the burrows filled.

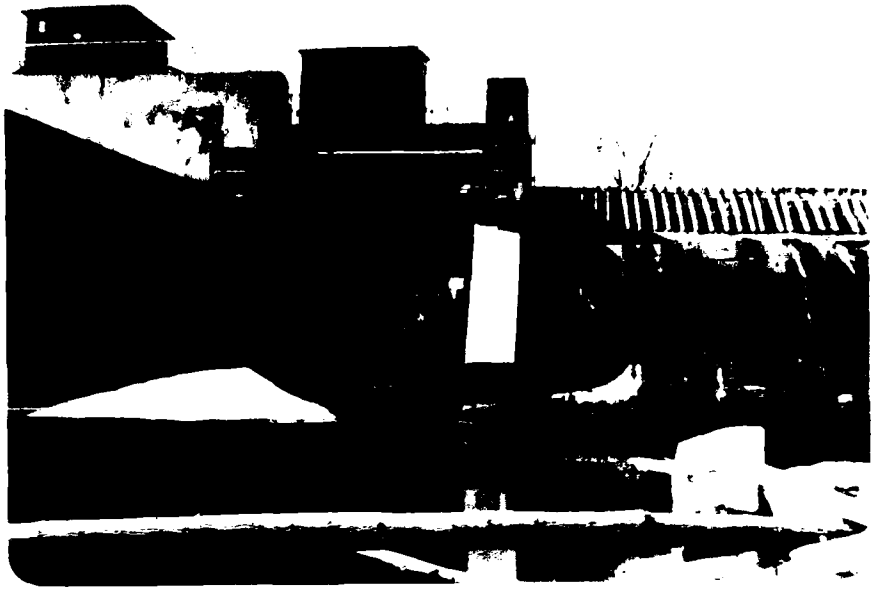
3. Deteriorated concrete and gunite on the spillway section and at the toe of the spillway should be repaired.

4. A formalized inspection system should be initiated to develop data on the conditions and maintenance operations at the facility.

5. A flood warning and emergency evacuation system should be implemented to alert the public in the event that conditions occur which could result in failure of the dam.

APPENDIX A

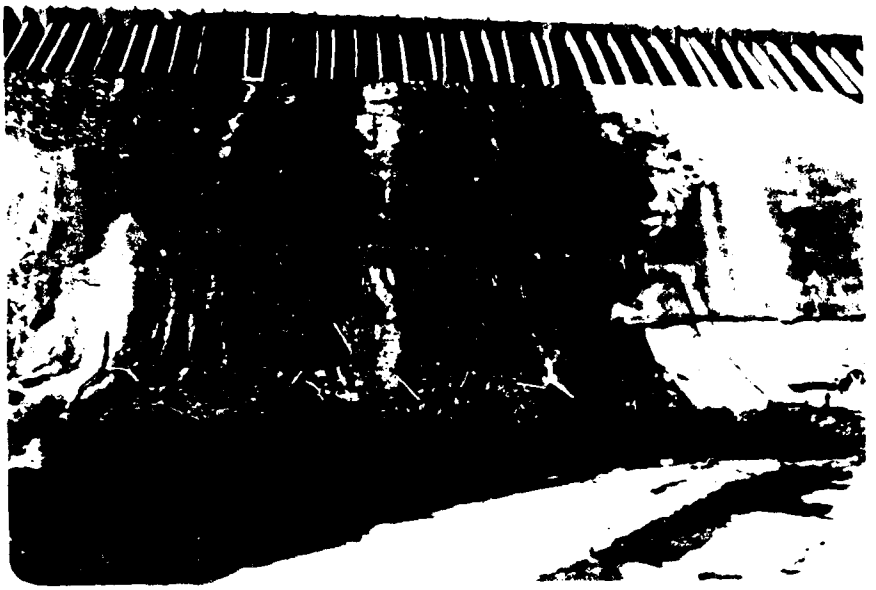
PHOTOGRAPHS



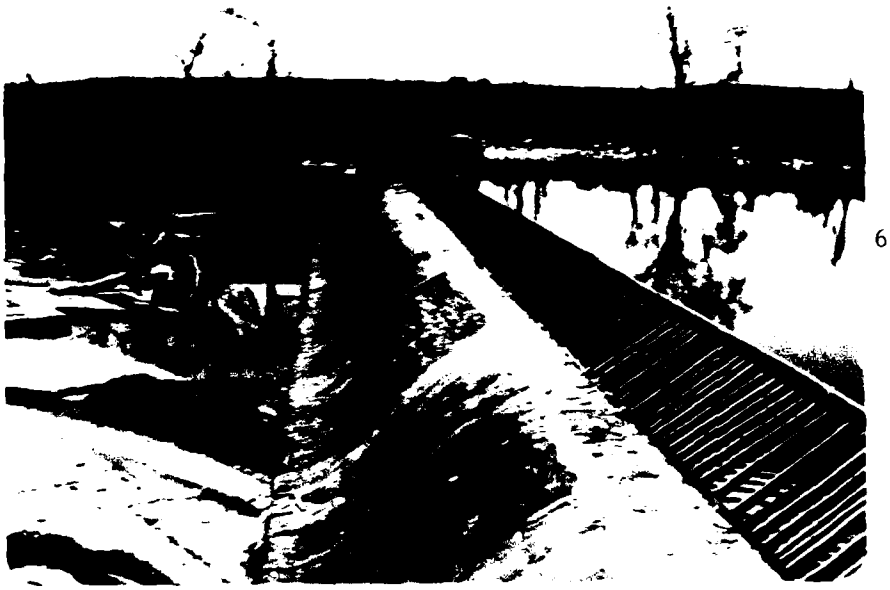
2. TAINTER GATE AND GATE HOUSE

3. GATEHOUSE AND TRASH RACKS FROM UPSTREAM

4. TRAINING WALL AT RIGHT ABUTMENT

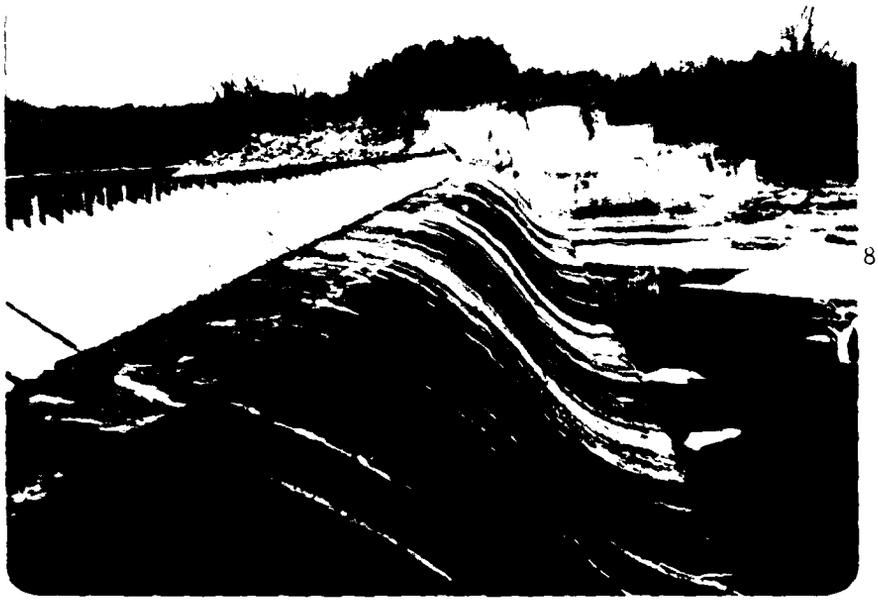


5. SPILLWAY SECTION SHOWING DETERIORATED GUNITE SURFACE



6. VIEW OF SPILLWAY FROM LEFT ABUTMENT

7. *UNDERCUT AREA OF* FOUNDATION BENEATH TOE OF SPILLWAY. NOTE: DETERIORATED GUNITE SURFACE AT TOE OF SPILLWAY



8. VIEW OF SPILLWAY FROM RIGHT ABUTMENT

9. ROCK FILL DOWNSTREAM SLOPE AT SITE OF OLD TIMBER CRIB DAM

10. EARTHFILL SECTION OF DAM

11. RAILROAD BRIDGE MAINLINE OF CONRAIL - DOWNSTREAM HAZARD

12. DOWNSTREAM HAZARD NOTE: RESIDENCE AT CENTER RIGHT OF PHOTO

APPENDIX B

VISUAL INSPECTION CHECKLIST

-15-3(9/80)

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam EAST CANADA LAKE DAM (BEARDSLEE)

Fed. I.D. # NY 201 DEC Dam No. _____

River Basin MOHAWK RIVER

Location: Town Manheim County Herkimer & Montgomery

Stream Name EAST CANADA CREEK

Tributary of MOHAWK RIVER

Latitude (N) 43°02' Longitude (W) 74° 45'

Type of Dam EARTHFILL

Hazard Category HIGH

Date(s) of Inspection MAY 8, 1981

Weather Conditions FAIR

Reservoir Level at Time of Inspection 494.3

b. Inspection Personnel F.W. BYSZEWSKI, J.A. GOMEZ, D.F. McCARTHY
H. MUSKATT - DAKE ENGINEERING COMPANY. R. LEVETT NIAGRA MOHAWK.

c. Persons Contacted (Including Address & Phone No.)

NIAGRA - MOHAWK CORPORATION
300 ERIE BLVD. WEST TELEPHONE 315-474-1511
SYRACUSE N.Y. 13202
ENGINEER ROBERT J. LEVETT

d. History:

Date Constructed 1924 Date(s) Reconstructed ~

Designer VIELE, BLACKWELL & BUCK ENGINEERS NEW YORK

Constructed By ~

Owner ADIRONDACK POWER AND LIGHT CORP.

2) Embankment

a. Characteristics

(1) Embankment Material ZONED EARTH

(2) Cutoff Type REINFORCED CONCRETE WALL 5' HIGH

(3) Impervious Core CLAY PUDDLE CORE

(4) Internal Drainage System NONE

(5) Miscellaneous ~

b. Crest

(1) Vertical Alignment NO IRREGULARITY DETECTED

(2) Horizontal Alignment UNIFORM.

(3) Surface Cracks NONE OBSERVED.

(4) Miscellaneous ~ OVERGROWN WITH TREES & BRUSH.

c. Upstream Slope

(1) Slope (Estimate) (V:H) VARIES SEE PLANS.

(2) Undesirable Growth or Debris, Animal Burrows TREES & BRUSH

(3) Sloughing, Subsidence or Depressions NONE OBSERVED

93-15-3(9/80)

(4) Slope Protection RIP RAP GOOD CONDITION

(5) Surface Cracks or Movement at Toe NOT OBSERVED DUE TO WATER IN IMPOUNDMENT.

d. Downstream Slope

(1) Slope (Estimate - V:H) VARIES (SEE PLANS)

(2) Undesirable Growth or Debris, Animal Burrows WOODCHUCK HOLES HEAVILY OVERGROWN WITH TREES & BRUSH.

(3) Sloughing, Subsidence or Depressions NONE OBSERVED

(4) Surface Cracks or Movement at Toe NONE OBSERVED

(5) Seepage WET AREA ✓ AT TOE OF SLOPE AT LOCATION OF IMPOUNDED WATER OLD STREAM CHANNEL

(6) External Drainage System (Ditches, Trenches; Blanket) NONE

(7) Condition Around Outlet Structure N/A.

(8) Seepage Beyond Toe SEE (5) above.

e. Abutments - Embankment Contact

HEAVILY OVERGROWN.

(1) Erosion at Contact NONE OBSERVED

(2) Seepage Along Contact NONE OBSERVED

3) Drainage System

a. Description of System NONE

b. Condition of System —

c. Discharge from Drainage System —

4) Instrumentation (Momumentation/Surveys, Observation Wells, Weirs, Piezometers, Etc.)

NONE

5) Reservoir

a. Slopes MODERATE

b. Sedimentation NO INFORMATION

c. Unusual Conditions Which Affect Dam NONE

6) Area Downstream of Dam

a. Downstream Hazard (No. of Homes, Highways, etc.) RT 5, CONRAIL MAIN LINE, GENERATING STATION 1 RESIDENCE.

b. Seepage, Unusual Growth NONE OBSERVED

c. Evidence of Movement Beyond Toe of Dam NONE OBSERVED

d. Condition of Downstream Channel NO RECENT EROSION NOTED

7) Spillway(s) (Including Discharge Conveyance Channel)

CONCRETE OGEE SHAPED

a. General SHOTCRETE SURFACE - DETERIORATED AND SPALLED EXPOSING ORIGINAL DETERIORATED CONCRETE.

b. Condition of Service Spillway GOOD ALIGNMENT, NO SIGNS OF STRUCTURAL INSTABILITY.

c. Condition of Auxiliary Spillway NONE

d. Condition of Discharge Conveyance Channel NO RECENT EROSION

8) Reservoir Drain/Outlet

Type: Pipe 12' PENSTOCK Conduit _____ Other 20' WIDE TAINTER GATE

Material: Concrete _____ Metal ✓ Other _____

Size: 12' Length 2000ft ±

Invert Elevations: Entrance PENSTOCK 476.75 TAINTER 487.75 Exit PENSTOCK: 345.5 @ POWER HOUSE

Physical Condition (Describe): Unobservable _____

Material: TAINTER - STEEL GOOD CONDITION

Joints: NO LEAKAGE Alignment _____

Structural Integrity: GOOD - NO KNOWN PROBLEMS

Hydraulic Capability: COMPUTE

Means of Control: Gate ✓ Valve _____ Uncontrolled _____

Operation: Operable ✓ Inoperable _____ Other _____

Present Condition (Describe): GOOD

9) Structural — SPILLWAY

a. Concrete Surfaces ORIGINAL SPILLWAY CONCRETE HEAVILY DETERIORATED
SHOTCRETE SURFACING DETERIORATED, SPALLED

b. Structural Cracking NONE OBSERVED

c. Movement - Horizontal & Vertical Alignment (Settlement)
NONE OBSERVED

d. Junctions with Abutments or Embankments OK

e. Drains - Foundation, Joint, Face [redacted]
SOME DETERIORATION AT TOE OF SPILLWAY
BOTH CONCRETE AND ROCK FOUNDATION

f. Water Passages, Conduits, Sluices NONE

g. Seepage or Leakage NONE OBSERVED

h. Joints - Construction, etc. OK

i. Foundation See 2.

j. Abutments GOOD

k. Control Gates ~~NONE~~ NONE

l. Approach & Outlet Channels APPROACH - IMPOUNDMENT

m. Energy Dissipators (Plunge Pool, etc.) —

n. Intake Structures GOOD CONDITION

o. Stability NO EVIDENCE OF INSTABILITY NOTED

p. Miscellaneous —

10) Appurtenant Structures (Power House, Lock, Gatehouse, Other)

a. Description and Condition

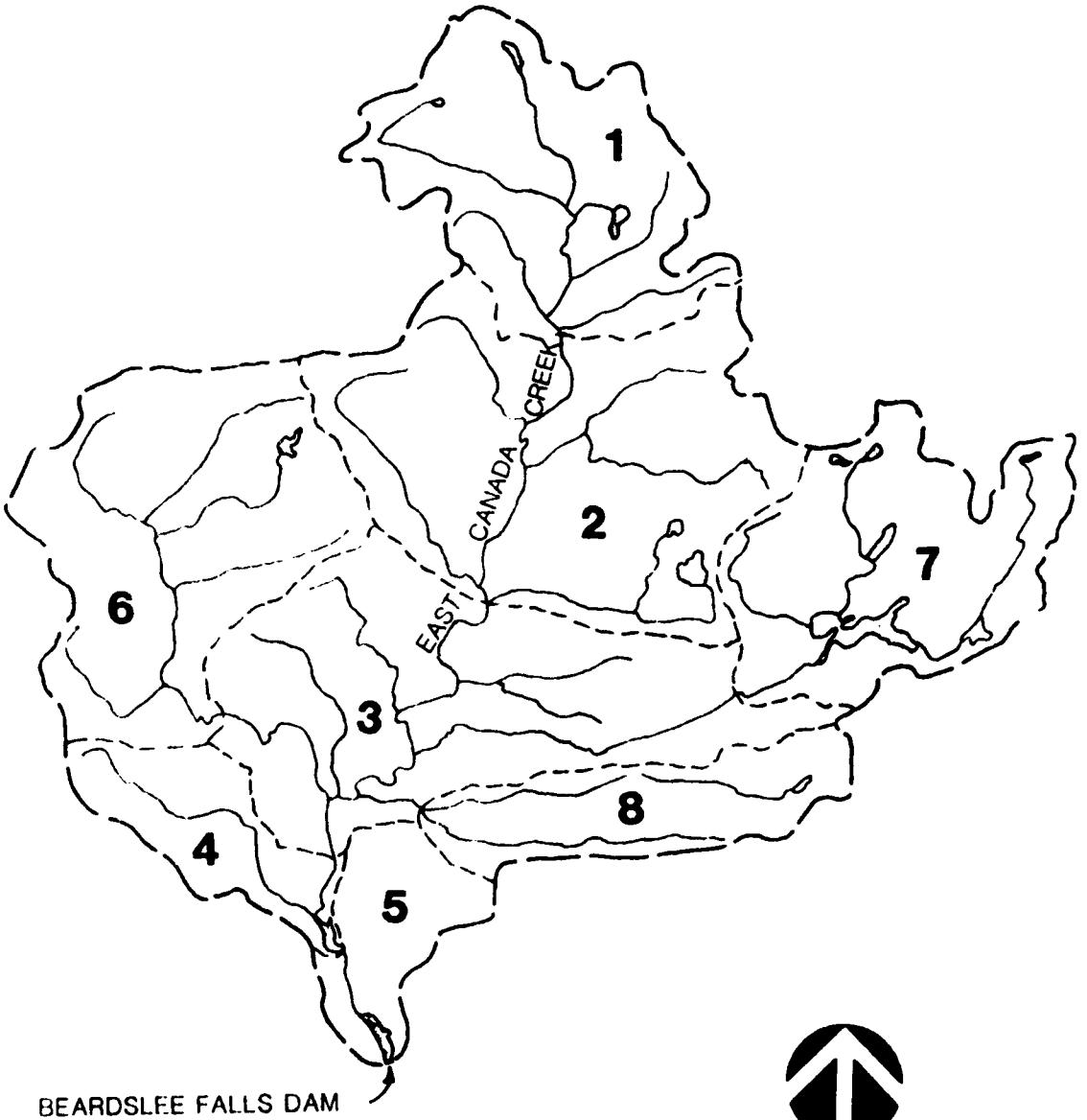
POWER HOUSE IS REMOTE FROM DAM.

11) Operation Procedures (Lake Level Regulation):

FLASH BOARDS PLACED DURING SUMMER TO 7' ABOVE SPILLWAY CREST. TO MAINTAIN OPTIMUM LEVEL FOR POWER GENERATING PURPOSES.

APPENDIX C

HYDROLOGIC/HYDRAULIC, ENGINEERING DATA AND COMPUTATIONS



LEGEND

WATERSHED AREA

SUB AREA

SCALE 1:250,000

DRAINAGE BASIN

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DESIGN BRIEF

PROJECT NAME N.Y.S. Dam Inspections 1981 DATE

SUBJECT Beardslee Falls Dam PROJECT NO 3930

Clark Hydrologic Parameters DRAWN BY FDM

Subarea	Area (mi²)	Storage Area (% + 1.0)	TC (hr)	R (hr)	STRTQ (cfs)	QRCSN (cfs)	RTIOA
1	38.50	1.65	11.82	8.57	49	400	1.3
2	61.45	2.78	14.35	13.80	85	625	1.3
3	54.20	1.07	11.80	6.46	74	550	1.3
4	15.40	2.84	9.76	11.32	13	150	1.3
5	12.20	3.30	9.12	12.27	5	120	1.3
6	46.25	1.67	12.43	8.90	61	470	1.3
7	41.00	7.30	10.37	27.39	53	420	1.3
8	19.00	1.76	9.94	8.07	21	200	1.3

The following parameters from "Upper Hudson & Mohawk River Basins Hydrologic Flood Routing Models" - Corps of Engineers.

$$(TC + R) = 7.52\, A^{0.315} * St^{0.415} \qquad \text{Eqn. 5.3a}$$

$$R = 3.30\, A^{0.155} * St^{0.775} \qquad \text{Eqn. 5.3b}$$

STRTQ from Fig. 5.1

QRCSN from Fig. 5.3

% Impervious is essentially a function of land areas as indicated in above Storage Area

Subarea	% Impervious
1	0.65%
2	1.78
3	0.07
4	1.84
5	3.3
6	0.67
7	6.3
8	1.76

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DESIGN BRIEF

PROJECT NAME N.Y.S. Dam Inspections 1981 DATE

SUB CT Beardslee Falls PROJECT NO. 2520

Depth-Area-Duration DRAWN BY JAG

PMP from HMR #33
for Lat. ~ 43°1.5' Long. ~ 74°44.7'
Index Rainfall = 18.9" for 200 mi², 24 hr
Zone 1

Duration	% Index*	Depth
6 hrs.	70%	13.25"
12 hrs.	84	15.9
24 hrs	96	18.15
48 hrs	101	19.1

* Adjusted for site area of 288 mi²

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DESIGN BRIEF

PROJECT NAME N.Y.S. Dam Inspections - 1981 DATE

SUBJECT E. Canada Lake PROJECT NO.

Spillway Rating Curve DRAWN BY AJ

Crest Elev. = 491.5
Length = 273'
Top of Left embankment ~ Elev. 508
Top of Right concrete wall ~ Elev. 506.5

In Summer flashboards are installed to elev. 498.5 (7' high). These are normally designed to fail under ~ 2' to 3' of overtopping. Therefore half of flashboards are assumed to fail at a headwater elev. of 501 and all are assumed to fail @ h.w. elev. of 502. When flashboards are in place $Q_1 = CLH_1^{3/2}$ where C ~ 3.32 for the crest + flashboards and H is measured from 498.5 (top of flashboards). After flashboards fail, $Q_2 = CLH_2^{3/2}$ where C ~ 2.8 for spillway (Ref: "Handbook of Hydraulics" - King & Brater) and H is measured above the spillway crest @ Elev. 491.5.

Elev.	H_1	H_2	Q_1	Q_2	$Q_{spillway}$
498.5			0	0	0
499	0.5'		320	0	320 cfs
500	1.5		1665	0	1665
501	2.5	9.5	1792	11,191	12,983
502		10.5'	0	26,010	26,010
504		12.5	0	33,780	33,780
505		13.5	0	37,915	37,915
506.5		15	0	44,410	44,410
508		16.5	0	51,230	51,230
510		18.5	0	60,825	60,825
512		20.5	0	70,950	70,950
514		22.5	0	81,580	81,580
516		24.5	0	92,700	92,700

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DESIGN BRIEF

PROJECT NAME N.Y.S. Dam Inspections - 1981 DATE

SUBJECT E. Canada Lake (Beardslee Falls) PROJECT NO

Flow Through Tainter Gate Opening DRAWN BY JAJ

Crest of Tainter Gate Opening = 487.5

Top of Tainter Gate in Closed Position = 490.5

Assumptions: for operation of gate under flood conditions

Headwater Elev.	Bottom of Tainter Gate		Top of Gate
499	491	1/3 open	501.5
502	494.5	1/3 open	503.1
505	498	full open	503.9

Flow may pass through the gate opening and over top of gate

Flow thru gates (Pressure Flow) Q_1

$Q_1 = \frac{2}{3}\sqrt{2g}\, C L (H_1^{3/2} - H_2^{3/2})$ "C" from Fig. 257 Design of Small ...

Flow over gate $Q_2 = C L H^{3/2}$ $C \sim 3.3$

H.W. Elev.	H_1	H_2	d	d/H	C	Q_1	Q_2	$Q_{TAINTER}$
499	11.5	8	3.5	0.30	0.688	1205	0	1205 cfs
500	12.5	9	3.5	0.28	0.691	1271	0	1271
501	13.5	10	3.5	0.26	0.693	1333	0	1333
502	14.5	7.5	7	0.48	0.668	2478	0	2478
504	16.5	9.5	7	0.43	0.674	2722	56	2778
505	17.5	7	10.5	0.60	0.656	3839	76	3915
506.5	19	8.5	↓	0.55	0.661	4105	277	4382
508	20.5	10		0.51	0.666	4361	548	4909
510	22.5	12		0.47	0.669	4664	994	5658
512	24.5	14		0.43	0.674	4968	1521	6490
514	26.5	16		0.40	0.677	5246	2118	7364
516	28.5	18		0.37	0.68	5514	2778	8292

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PROJECT NAME N.Y.S. Dam Inspections - 1981 DATE

SUBJECT E. Canada Lake PROJECT NO.

Combined Discharge Capacity DRAWN BY JAG

Through Tainter Gate Opening & Spillway

Under Assumed Operation of Facility

Under Flood Conditions

Elev.	Q_S	$Q_{T.G.}$	Q_{total}
498.5	0	0 cfs	0 cfs
499	320 cfs	1205	1525
500	1665	1271	2935
501	12,983	1333	14,315
502	26,010	2478	28,490
504	33,780	2778	36,560
505	37,915	3915	41,830
506.5	44,410	4382	48,790
508	51,230	4909	56,140
510	60,825	5658	66,485
512	70,950	6490	77,440
514	81,580	7364	88,945
516	92,700	8292	100,990

For headwater heights in excess of 506.5 the right concrete non-overflow wall will be overtopped $Q_w = CLH^{3/2}$; $L = 200'$ $C \sim 2.65$, therefore for HEC-1 Analysis Q_T & Q_w will be added and flow over earth embankment will be handled in SD card

Elev	Q_w	Q_T	Q_{HEC}
508	975 cfs	56,140	57,115 cfs
510	3470	66,485	69,955
512	6835	77,440	84,275
514	10,885	88,945	99,830
516	15,520	100,990	116,510

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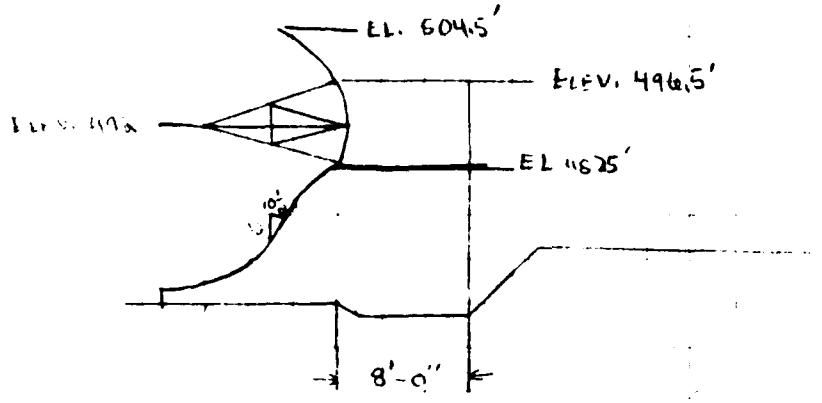
DESIGN BRIEF

PROJECT NAME N.Y.S. Dam Inspections DATE

SUBJECT Middle Falls Dam PROJECT NO. 2136

Tainter Drain Discharge Rating DRAWN BY TAM



Tainter Gate

Compute flows with Tainter gate full-open.

Spillway elevation. $Q = CLH^{3/2}$ L = 20 Ft. Assume C = 2.8

$Q = 2.8(20)(4)^{3/2} = 448$ cfs.

For Headwater at top of Dam Elev. 508, Flow passes through gate opening and over top of gate (see Calculation sheet 5)

$Q = 4910$ cfs

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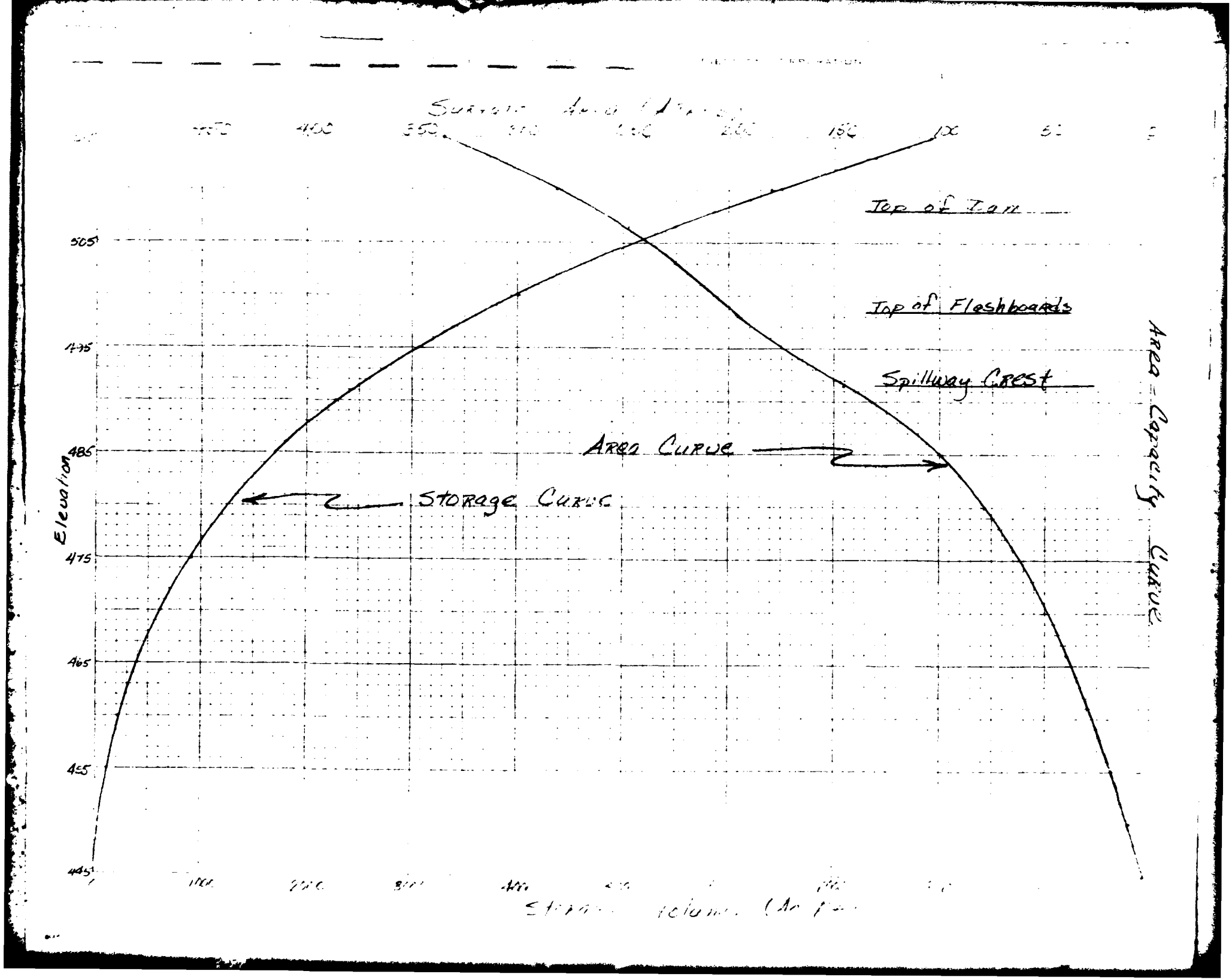
DESIGN BRIEF

PROJECT NAME N.Y.S. Dam Inspections -1981 DATE

SUBJECT East Canada Lake PROJECT NO

Stage - Storage Relationship DRAWN BY

Elev. (M.S.L.)	Area (M.S.L.) C	Area (Ac) O	Vol. (Ac-ft)	Σ Vol Ac Ft C
			5	
465	0.1	2.3		5
470	0.4	9.2	28.8	33.8
475	0.8	18.4	68.9	102.7
480	1.3	29.3	120.6	223.3
485	1.7	39.0	172.1	395.4
490	2.1	50.5	223.8	619.2
495	2.8	64.3	287.0	906.2
500	3.4	78.1	355.9	1262.1
505	4.3	98.7	442.0	1704.1
510	5.75	132.0	576.9	2281.1
515	6.3	144.6	207.5	2488
520	7.6	174.5	558.4	3046
525	9.1	208.9	958.5	4005
530.5	10.75	246.8	1481	5486
535	11.35	260.6	1380.6	6866
540	12.25	281.2	1354.9	8221
545	14.6	335.2	1541	9762


Top of Dam
Top of Fleshboards
Spillway Crest
Area Curve
Storage Curve
Elevation
505
495
485
475
465
455
445
Area - Capacity Curve

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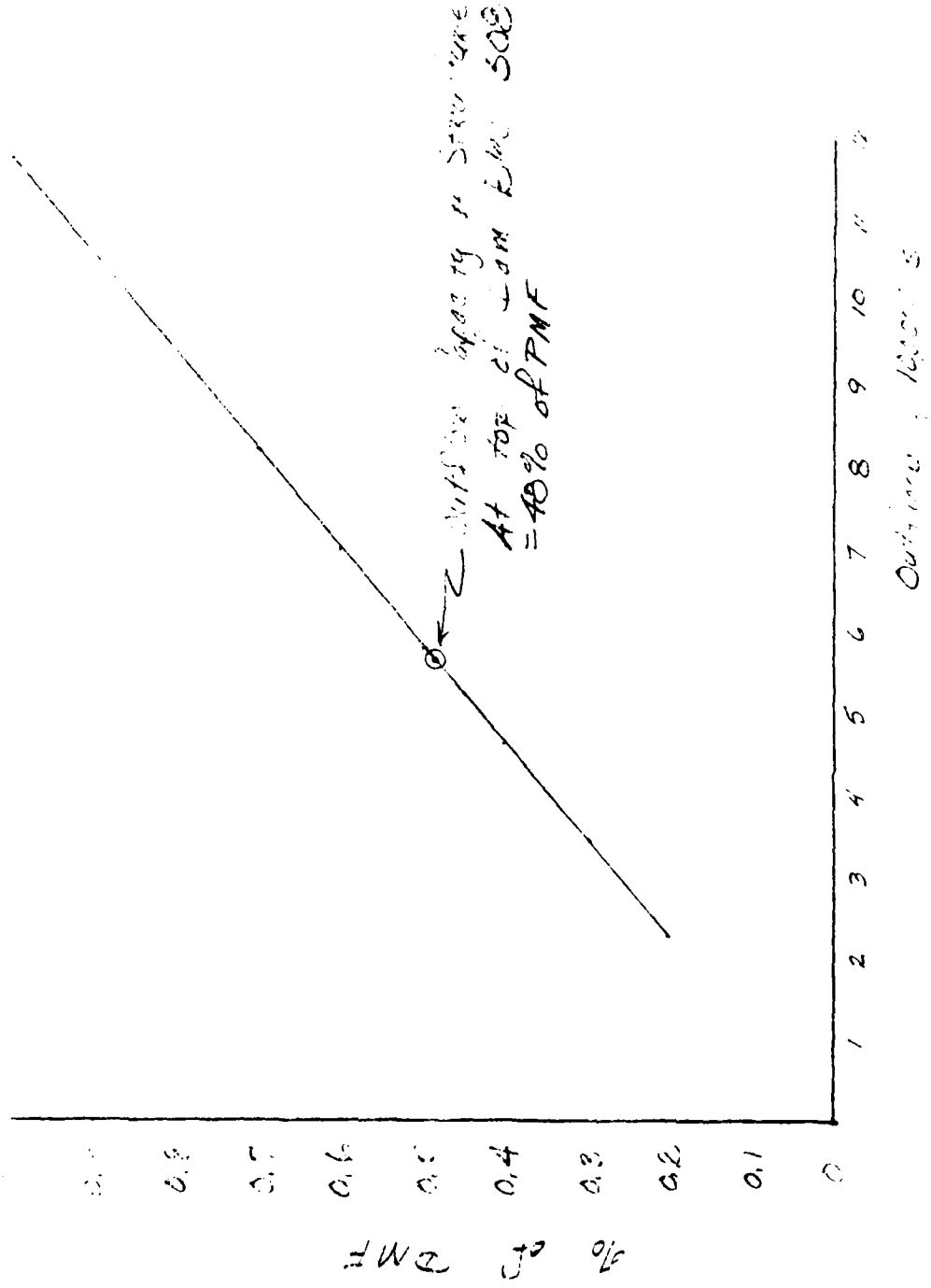
TEL 315•797•5800

PROJECT NAME N.Y.S. Dam Inspections - 1981 DATE

SUBJECT Example Case PROJECT NO

ie PMF vs. Outflow DRAWN BY



N.Y. #201

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

AREA-CAPACITY DATA:

	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1) Top of Dam	508	260	5865
2) Design High Water (Max. Design Pool)	N/A		
3) Auxiliary Spillway Crest - Tainter Gate	487.5	115	1950
4) Pool Level with Flashboards	498.5	198	3700
5) Service Spillway Crest	491.5	145	2490

DISCHARGES

	Volume (cfs)
1) Average Daily	635
2) Spillway @ Maximum High Water (Top of Dam)	51230
3) Spillway @ Design High Water	N/A
4) Tainter Gate @ [redacted] Spillway Crest Elevation	450
5) Low Level Outlet - Tainter Gate w/ water level @ Top of Dam	4910
6) Total (of all facilities) @ Maximum High Water	57,340 *
7) Maximum Known Flood	24,000
8) At Time of Inspection	Unknown - flow through hydro-power facility

* includes 1200 cfs through hydro-power system

CREST: ELEVATION: 508

Type: Earth with concrete core wall

Width: 55 ft ± Length: 900 ft ±

Spillover Concrete gravity Spillway

Location To Right of earthen embankment

SPILLWAY:

PRINCIPAL (Tainter Gate)		EMERGENCY
487.5	Elevation	491.5
Concrete Gravity with tainter gate control	Type	Concrete Gravity ogee shaped downstream face
20 ft	Width	2.73 ft

Type of Control

Uncontrolled

Controlled:

Tainter Gate	Type (Flashboards; gate)	Flashboards
1	Number	
20' wide, 11' high	Size/Length	Full length of Spillway 7' high maximum
Concrete	Invert Material	Concrete

Anticipated Length of operating service

Chute Length N/A

Height Between Spillway Crest & Approach Channel Invert (Weir Flow) 18.5'

HYDROMETEROLOGICAL GAGES:

Type : USGS # 01348000

Location: 3000 ft downstream of Dam - East Creek, NY

Records: 1945 through Present

Date - Oct. 2, 1945

Max. Reading - 24,000 cfs

FLOOD WATER CONTROL SYSTEM:

Warning System: None at Present

Method of Controlled Releases (mechanisms):

Through hydropower system (12'Ø penstock) and through 20' wide x 11' high tainter gate

DRAINAGE AREA: 288 SQ. MI.

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: Predominately agricultural with a few interspersed towns.

Terrain - Relief: Moderate to steeply sloped hills.

Surface - Soil: Not Known

Runoff Potential (existing or planned extensive alterations to existing (surface or subsurface conditions)

No extensive alterations to drainage area known to be planned.

Potential Sedimentation problem areas (natural or man-made; present or future)

Unknown

Potential Backwater problem areas for levels at maximum storage capacity including surcharge storage:

None Known

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the Reservoir perimeter:

Location: N/A

Elevation:

Reservoir:

Length @ Maximum Pool 1.9 ± (Miles)

Length of Shoreline (@ Spillway Crest) 3.8 ± (Miles)

```
(0001)   A1       BEARDSLEE FALLS DAM  FILE IS AB2K-F2
(0002)   A2       HEC-1DB  (CLARK PARAMETERS)
(0003)   A3       0.5 PMF - DAM OVERTOPPING ANALYSIS
(0004)   B     90       1       0       0       0       0       0       0       4       0
(0005)   B1     5        0       0       0       0       0       0       0       0       0
(0006)   J      1        8       1       0       0       0       0       0       0       0
(0007)   J1  0.2     0.3     0.4     0.5     0.6     0.7     0.8     1.0
(0008)   K      0      100       0       0       0       0       1       0       0       0
(0009)   K1       RUNOFF SUBAREA 1
(0010)   M      1        0    38.5       0     288       0       0       0       1       0
(0011)   P      0     18.9      70      84      96     101       0       0       0       0
(0012)   T      0        0       6       0       0       0     1.0   0.075       0   0.007
(0013)   V  11.82     8.57
(0014)   X   49.0      400     1.3
(0015)   K      1      200       0       0       0       0       1       0       0       0
(0016)   K1       ROUTE TO SUBAREA 2
(0017)   Y      0        0       0       1       1       0       0       0       0       0
(0018)   Y1     1        0       0       0       0       0      -1       0       0       0
(0019)   Y6  0.08    0.035    0.08    1126    1160   34400   0.015       0       0       0
(0020)   Y7   100     1160     180    1140     300    1130     310    1126     350    1126
(0021)   Y7   360     1130     430    1140     490    1160       0       0       0       0
(0022)   K      0      200       0       0       0       0       1       0       0       0
(0023)   K1       RUNOFF SUBAREA 2
(0024)   M      1        0   61.45       0     288       0       0       0       1       0
(0025)   P      0     18.9      70      84      96     101       0       0       0       0
(0026)   T      0        0       0       0       0       0     1.0   0.075       0   0.018
(0027)   V  14.35    13.80
(0028)   X   85.0      625     1.3
(0029)   K      2      200       0       0       0       0       1       0       0       0
(0030)   K1       COMBINE 2 HYDROGRAPHS 1+2=2
(0031)   K      1      302       0       0       0       0       1       0       0       0
(0032)   K1       ROUTE TO SUBAREA 3
(0033)   Y      0        0       0       1       1       0       0       0       0       0
(0034)   Y1     1        0       0       0       0       0      -1       0       0       0
(0035)   Y6  0.08    0.035    0.08    1001    1040   55200   0.005       0       0       0
(0036)   Y7   100     1040     380    1020     440    1005     450    1001     510    1001
(0037)   Y7   520     1005     600    1020     760    1040       0       0       0       0
(0038)   K      0      300       0       0       0       0       1       0       0       0
```

```
(0039)  K1      RUNOFF SUBAREA 3
(0040)  M       1       0       54.20   0       288     0       0       0       1       0
(0041)  P       0       18.9    70      84      96      101     0       0       0       0
(0042)  T       0       0       0       0       0       0       1.0     0.075   0       0.001
(0043)  V       11.66   6.46
(0044)  X       74.0    550     1.3
(0045)  K       0       600     0       0       0       0       1       0       0       0
(0046)  K1      RUNOFF SUBAREA 6
(0047)  M       1       0       46.25   0       288     0       0       0       1       0
(0048)  P       0       18.9    70      84      96      101     0       0       0       0
(0049)  T       0       0       0       0       0       0       1.0     0.075   0       0.007
(0050)  V       12.43   8.95
(0051)  X       61.0    470     1.3
(0052)  K       1       306     0       0       0       0       1       0       0       0
(0053)  K1      ROUTE TO SUBAREA 3
(0054)  Y       0       0       0       1       1       0       0       0       0       0
(0055)  Y1      1       0       0       0       0       0       -1      0       0       0
(0056)  Y6      0.08    0.035   0.08    1071    1100    42400   0.009   0       0       0
(0057)  Y7      100     1100    140     1080    260     1075    270     1071    310     1071
(0058)  Y7      320     1075    420     1080    580     1110    0       0       0       0
(0059)  K       0       700     0       0       0       1       0       0       0       0
(0060)  K1      RUNOFF SUBAREA 7 (CANADA LAKE AREA)
(0061)  M       1       0       41.00   0       288     0       0       0       1       0
(0062)  P       0       18.9    70      84      96      101     0       0       0       0
(0063)  T       0       0       0       0       0       0       1.0     0.075   0       0.063
(0064)  V       10.37   27.39
(0065)  X       53.0    420     1.3
(0066)  K       1       700     0       0       0       0       1       0       0       0
(0067)  K1      ROUTE THROUGH CANADA LAKE - STEWART'S LANDING DAM
(0068)  Y       0       0       0       1       1       0       0       0       0       0
(0069)  Y1      1       0       0       0       0       0       -1542.4 -1      0       0
(0070)  Y41542.4        1543.4  1544.4  1545.4  1546.4  1547.4  1548.4  1549.4  1550.4  1552.4
(0071)  Y41554.4        1556.4  1558.4  1560.4  0       0       0       0       0       0
(0072)  Y5      0       403     1140    2100    3245    4555    6075    7880    9975    14900
(0073)  Y5      20220   26275   32100   38300   0       0       0       0       0       0
(0074)  $S      0       925     4030    10215   12260   14730   20225   26760   34385   0
(0075)  $E1508.4        1520    1530    1540    1542.4  1545    1550    1555    1560    0
(0076)  $$1542.4        0       0       0       0       0       0       0       0       0
```

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(0077)  $D1550.4    2.65     1.5      360       0       0       0       0       0       0
(0078)  K      1     307       0        0       0       0       1       0       0       0
(0079)  K1        ROUTE TO SUBAREA 3
(0080)  Y      0       0       0        1       1       0       0       0       0       0
(0081)  Y1     1       0       0        0       0       0      -1       0       0       0
(0082)  Y6  0.08   0.035    0.08     1142    1180   70400   0.012       0       0       0
(0083)  Y7   100    1180     180     1160     220    1145   227.5    1142   252.5    1142
(0084)  Y7   260    1145     340     1160     390    1180       0       0       0       0
(0085)  K      0     800       0        0       0       0       1       0       0       0
(0086)  K1        RUNOFF SUBAREA 8
(0087)  M      1       0   19.00        0     288       0       0       0       1       0
(0088)  P      0    18.9      70       84      96     101       0       0       0       0
(0089)  T      0       0       0        0       0       0     1.0   0.075       0   0.008
(0090)  W   9.94    8.07
(0091)  X   21.0     200     1.3
(0092)  K      1     308       0        0       0       0       1       0       0       0
(0093)  K1        ROUTE TO SUBAREA 3
(0094)  Y      0       0       0        1       1       0       0       0       0       0
(0095)  Y1     1       0       0        0       0       0      -1       0       0       0
(0096)  Y6  0.08   0.035    0.08      911     940   24000   0.008       0       0       0
(0097)  Y7   100     940     220      920     280     915     290     911     350     911
(0098)  Y7   360     915     440      920     540     940       0       0       0       0
(0099)  K      5     300       0        0       0       0       1       0       0       0
(0100)  K1        COMBINE 5 HYDROGRAPHS AT DOLGEVILLE 2+3+6+7+8=3
(0101)  K      1     303       0        0       0       0       1       0       0       0
(0102)  K1        ROUTE OVER DOLGEVILLE DAM
(0103)  Y      0       0       0        1       1       0       0       0       0       0
(0104)  Y1     1       0       0        0       0       0    -734      -1       0       0
(0105)  Y4   734   734.8   735.2    735.6   736.4   737.2   738.4   739.9   742.9   745.9
(0106)  Y4 748.9   751.9   754.9    757.9   760.9   763.9   765.9   770.9   775.9   780.9
(0107)  Y5     0     501     882     1377    2238    3258    5308    8172   15013   23115
(0108)  Y5 32304   42464   53511    65378   78012   91368  100656  125146  151352  179168
(0109)  $S     0      30      68      113     166     229     302     481     588     710
(0110)  $S  1000    1173    1366     1816    2075    2358    2951    3286    3640    4030
(0111)  $E   734     736     738      740     742     744     746     750     752     754
(0112)  $E   758     760     762      766     768     770     774     776     778     780
(0113)  $S   734       0       0        0       0       0       0       0       0       0
(0114)  $D   740    2.65     1.5       50       0       0       0       0       0       0
```

```
(0115)  K      0     400       0       0       0       0       1       0       0       0
(0116)  K1       RUNOFF SUBAREA 4
(0117)  M      1       0    15.4       0     288       0       0       0       1       0
(0118)  P      0    18.9      70      84      96     101       0       0       0       0
(0119)  T      0       0       0       0       0       0     1.0   0.075       0   0.016
(0120)  V   9.76   11.32
(0121)  X  13.0     150     1.3
(0122)  K      2     400       0       0       0       0       1       0       0       0
(0123)  K1       COMBINE 2 HYDROGRAPHS 3+4=4
(0124)  K      1     403       0       0       0       0       1       0       0       0
(0125)  K1       ROUTE THRU KYSER LAKE AND OVER INGHAMS DAM
(0126)  Y      0       0       0       1       1       0       0       0       0       0
(0127)  Y1     1       0       0       0       0       0  -661.8      -1       0       0
(0128)  Y4 657.3   659.0     660     661   661.8     662     663     664   665.8     666
(0129)  Y4   667     669     670     672     673     675     677     680     685     690
(0130)  Y5     0    1500    3000    5500    7600    8200   11500   14700   21000   21700
(0131)  Y5 25400   33700   38200   47800   53000   64200   76200   94300  127100  163000
(0132)  $S     0     356     826    1330    1910    2300    3080    3860    4180    4670
(0133)  $S  5080    5500    5950    6400    6900    7380    7820    9170   10500   12000
(0134)  $E   634     638     642     646     650     654   657.3   661.8     664     666
(0135)  $E   668     670     672     674     676     678     680     685     690     695
(0136)  $$ 657.3       0       0       0       0       0       0       0       0       0
(0137)  $D 665.8    2.65     1.5     480       0       0       0       0       0       0
(0138)  K      1     504       0       0       0       0       1
(0139)  K1       ROUTE TO SUBAREA 5
(0140)  Y      0       0       0       1       1
(0141)  Y1     1       0       0       0       0       0      -1
(0142)  Y6  0.08   0.035    0.08     509     540    8400   0.010
(0143)  Y7   100     540     330     520     380     515     395     509     545     509
(0144)  Y7   560     515     800     520    1160     540
(0145)  K      0     500       0       0       0       0       1       0       0       0
(0146)  K1       RUNOFF SUBAREA 5
(0147)  M      1       0   12.20       0     288       0       0       0       1       0
(0148)  P      0    18.9      70      84      96     101       0       0       0       0
(0149)  T      0       0       0       0       0       0     1.0   0.075       0   0.023
(0150)  V   9.12   12.27
(0151)  X    5.0     120     1.3
(0152)  K      2     500       0       0       0       0       1       0       0       0
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(0153)   K1       COMBINE 2 HYDROGRAPHS 4+5=5 TOTAL INFLOW TO EAST CANADA LAKE
(0154)   K        1      500        0        0        0        0        1        0        0        0
(0155)   K1       ROUTE THROUGH RESERVOIR AND OVER BEARDSLEE FALLS DAM
(0156)   Y        0        0        0        1        1        0        0        0        0        0
(0157)   Y1       1        0        0        0        0        0     -498.5      -1        0        0
(0158)   Y4   498.5      499      500      501      502      504      505    506.5      508      510
(0159)   Y4     512      514      516
(0160)   Y5       0     1525     2935    14315    28490    36560    41830    48790    57115    69955
(0161)   Y5   84275    99830   116510
(0162)   $S       0        5       34      103      223      395      619      906     1262     1704
(0165)   $S    2280     2487     3046     4004     5485     5866     6408     7948     9756
(0164)   $E     443      445      450      455      460      465      470      475      480      485
(0165)   $E     490    491.5      495      500    506.5      508      510      515      520
(0166)   $$   498.5        0        0        0        0        0        0        0        0        0
(0167)   $D     508     2.65      1.5      900        0        0        0        0        0        0
(0168)   K      99        0        0        0        0        0        0        0        0        0
(0169)   A
(0170)   A
(0171)   A
(0172)   A
(0173)   A
```

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	100
ROUTE HYDROGRAPH TO	200
RUNOFF HYDROGRAPH AT	200
COMBINE 2 HYDROGRAPHS AT	200
ROUTE HYDROGRAPH TO	302
RUNOFF HYDROGRAPH AT	300
RUNOFF HYDROGRAPH AT	600
ROUTE HYDROGRAPH TO	306
RUNOFF HYDROGRAPH AT	700
ROUTE HYDROGRAPH TO	700
ROUTE HYDROGRAPH TO	307
RUNOFF HYDROGRAPH AT	800
ROUTE HYDROGRAPH TO	308
COMBINE 5 HYDROGRAPHS AT	300
ROUTE HYDROGRAPH TO	303
RUNOFF HYDROGRAPH AT	400
COMBINE 2 HYDROGRAPHS AT	400
ROUTE HYDROGRAPH TO	403
ROUTE HYDROGRAPH TO	504
RUNOFF HYDROGRAPH AT	500
COMBINE 2 HYDROGRAPHS AT	500
ROUTE HYDROGRAPH TO	500

END OF NETWORK

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**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********************************

RUN  DATE?MON, AUG 31 1981
     TIME?10:46:27
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BEARDSLEE FALLS DAM FILE IS ABZK-F2
HEC-1DB (CLARK PARAMETERS)
0.5 PMF - DAM OVERTOPPING ANALYSIS

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
90	1	0	0	0	0	0	0	4	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 8 LRTIO= 1

RTIOS= .20 0.30 0.40 0.50 0.60 0.70 0.80 1.00

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 1

ISTAQ	ICOPP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
100	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	0	38.50	0.00	288.00	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	18.90	70.00	84.00	96.00	101.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.890

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
	.00	0.00	1.00	0.00	0.00	1.00	1.00	0.07	0.00	0.01

UNIT HYDROGRAPH DATA

TC= 11.62 R= 0.57 NTA= 0

RECESSION DATA
STRTQ= 49.00 QRCSN= 400.00 RTIOR= 1.30

UNIT HYDROGRAPH 52 END-OF-PERIOD ORDINATES, LAG= 10.33 HOURS, CP= 0.66 VOL= 1.00

46.	177.	358.	564.	787.	1019.	1239.	1416.	1538.	1607.
1620.	1559.	1422.	1265.	1126.	1002.	891.	793.	706.	628.
559.	497.	442.	393.	350.	311.	277.	247.	219.	195.
174.	155.	137.	122.	109.	97.	86.	77.	68.	61.
54.	48.	43.	38.	34.	30.	27.	24.	21.	19.
17.	15.								

Q

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	16.98	14.29	2.69	355060.
										(431.)	(363.)	(68.)	(10054.17)

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HYDROGRAPH ROUTING

ROUTE TO SUBAREA 2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
200	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.080	0.035	0.080	1126.0	1160.0	34400.	0.0150

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

130.00	1160.00	160.00	1140.00	300.00	1130.00	310.00	1126.00	350.00	1126.00
390.00	1130.00	430.00	1140.00	490.00	1160.00				

STORAGE	0.0	62.84	138.33	236.80	382.33	575.89	817.53	1107.14	1444.36
	2192.50	2593.11	3011.43	3447.44	3901.16	4372.57	4861.66	5366.49	5893.00

OUTFLOW	0.00	568.34	1882.74	4089.52	7238.39	11389.39	16642.55	23092.23	30909.81
	51166.48	63157.77	76375.25	90816.59	106484.06	123383.16	141521.97	160910.44	181559.75
STAGE	1126.00	1127.79	1129.58	1131.37	1133.16	1134.95	1136.74	1138.53	1140.31
	1143.89	1145.68	1147.47	1149.26	1151.05	1152.84	1154.63	1156.42	1158.21
FLOW	0.00	568.34	1882.74	4089.52	7238.39	11389.39	16642.55	23092.23	30909.81
	51166.48	63157.77	76375.25	90816.59	106484.06	123383.16	141521.97	160910.44	181559.75

MAXIMUM STAGE IS 1131.3

MAXIMUM STAGE IS 1132.5

MAXIMUM STAGE IS 1133.5

MAXIMUM STAGE IS 1134.4

MAXIMUM STAGE IS 1135.2

MAXIMUM STAGE IS 1135.8

MAXIMUM STAGE IS 1136.5

MAXIMUM STAGE IS 1137.7

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
200	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	3	61.45	0.00	288.00	0.00	0.000	0	1	

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	16.90	72.00	84.00	96.00	101.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 1.893

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.07	0.00	0.02

UNIT HYDROGRAPH DATA

TC= 14.35 R= 13.40 NTA=

RECESSION DATA
STRTQ= 85.10 QRCSN= 625.00 RTIOR= 1.30

UNIT HYDROGRAPH 81 END-OF-PERIOD ORDINATES, LAG= 13.31 HOURS, CP= 0.59 VOL= 1.00

36.	136.	277.	444.	629.	827.	1033.	1240.	1425.	1576.
1690.	1769.	1810.	1806.	1736.	1622.	1509.	1403.	1305.	1214.
1129.	1053.	977.	908.	845.	786.	731.	680.	632.	588.
547.	509.	473.	440.	409.	381.	354.	329.	306.	285.
265.	246.	229.	213.	198.	184.	171.	159.	148.	138.
128.	119.	111.	103.	96.	89.	83.	77.	72.	67.
62.	58.	54.	50.	46.	43.	40.	37.	35.	32.
30.	28.	26.	24.	23.	21.	19.	18.	17.	16.
15.									

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	16.98	14.32	2.66	547312.
										(431.)	(364.)	(68.)	(15498.13)

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COMBINE HYDROGRAPHS

COMBINE 2 HYDROGRAPHS 1+2=2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
200	2	0	0	0	0	1	0	0

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HYDROGRAPH ROUTING

ROUTE TO SUBAREA 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
502	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	3	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

[illegible]	[illegible]	ELNVT	ELMAX	RLNTH	SEL
.0837	0.0357	0.0850	1001.0	1040.0	55200.	0.00500

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
100.00 1040.00 380.00 1020.00 440.00 1005.00 450.00 1001.00 510.00 1001.00
520.00 1005.00 600.00 1020.00 760.00 1040.00

STORAGE	0.00	169.41	365.55	601.11	886.50	1221.72	1606.78	2041.66	2526.37
	3663.99	4382.29	5218.06	6171.22	7241.83	8429.88	9735.38	11158.33	12698.71
OUTFLOW	0.00	613.35	2015.54	4301.21	7331.70	11112.46	15657.03	20983.58	27113.10
	41516.96	50002.64	59709.42	70701.17	83056.33	96855.58	112179.19	129106.16	147713.50
STAGE	1001.00	1003.05	1005.11	1007.16	1009.21	1011.26	1013.32	1015.37	1017.42
	1021.53	1023.58	1025.63	1027.68	1029.74	1031.79	1033.84	1035.89	1037.95
FLOW	0.00	613.35	2015.54	4301.21	7331.70	11112.46	15657.03	20983.58	27113.10
	41516.96	50002.64	59709.42	70701.17	83056.33	96855.58	112179.19	129106.16	147713.50

MAXIMUM STAGE IS 1009.8

MAXIMUM STAGE IS 1012.0

MAXIMUM STAGE IS 1013.8

MAXIMUM STAGE IS 1015.4

MAXIMUM STAGE IS 1016.9

MAXIMUM STAGE IS 1018.2

MAXIMUM STAGE IS 1019.4

MAXIMUM STAGE IS 1021.7

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
380	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	[illegible]	54.[illegible]	0.00	266.70	0.00	0.000	[illegible]	1	[illegible]

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	18.90	70.00	84.00	96.00	101.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.890

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.07	0.00	0.00

UNIT HYDROGRAPH DATA

TC= 11.80 R= 6.46 NTA= 0

RECESSION DATA

STRTQ= 74.00 QRCSN= 550.00 RTIOR= 1.30

UNIT HYDROGRAPH 41 END-OF-PERIOD ORDINATES, LAG= 9.99 HOURS, CP= 0.74 VOL= 1.00

88.	323.	644.	1005.	1385.	1772.	2128.	2397.	2564.	2633.
2602.	2440.	2152.	1843.	1578.	1351.	1157.	991.	849.	727.
622.	533.	456.	391.	335.	287.	245.	210.	180.	154.
132.	113.	97.	83.	71.	61.	52.	45.	38.	33.
28.									

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	16.98	14.28	2.71	503704.
										(431.)	(363.)	(69.)	(14263.29)

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 6

JSTAQ	JCOMP	JECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
6.00	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	0	46.25	0.00	268.00	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	18.90	70.00	84.00	96.00	101.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.890

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.07	0.00	0.01

UNIT HYDROGRAPH DATA

TC= 12.45 R= 8.90 NTA= 3

RECESSION DATA
STRTQ= 61.00 QRCSN= 470.00 RTIOR= 1.30

UNIT HYDROGRAPH 54 END-OF-PERIOD ORDINATES, LAG= 11.04 HOURS, CP= 0.67 VOL= 1.00

51.	191.	385.	609.	851.	1103.	1352.	1565.	1721.	1822.
1865.	1847.	1736.	1567.	1401.	1252.	1118.	999.	893.	798.
713.	637.	570.	509.	455.	406.	363.	325.	290.	259.
232.	207.	185.	165.	148.	132.	118.	105.	94.	84.
75.	67.	60.	54.	48.	43.	38.	34.	31.	27.
24.	22.	20.	17.						

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	16.98	14.29	2.69	425800.
										(431.)	(363.)	(68.)	(12057.30)

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HYDROGRAPH ROUTING

ROUTE TO SUBAREA 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
306	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

GN(1)	GN(2)	GN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0800	0.0350	0.0800	1071.0	1100.0	42400.	0.00900

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
100.00 1100.00 140.00 1080.00 260.00 1075.00 270.00 1071.00 310.00 1071.00
320.00 1075.00 420.00 1080.00 580.00 1100.00

STORAGE	0.00	65.09	141.51	235.62	412.42	688.98	1064.88	1494.47	1946.74
	2919.29	3459.57	3962.52	4546.14	5136.43	5747.39	6381.02	7037.32	7716.30

OUTFLOW	0.00	335.83	1103.33	2319.48	4184.42	6812.71	10389.25	15205.97	20959.05
	35147.40	43553.82	52827.91	62969.75	73982.09	85869.81	98639.25	112297.88	126854.09
STAGE	1071.00	1072.53	1074.05	1075.58	1077.10	1078.63	1080.16	1081.68	1083.21
	1084.26	1087.79	1089.31	1090.84	1092.37	1093.89	1095.42	1096.94	1098.47
FLOW	0.00	335.83	1103.33	2319.48	4184.42	6812.71	10389.25	15205.97	20959.05
	35147.40	43553.82	52827.91	62969.75	73982.09	85869.81	98639.25	112297.88	126854.09

MAXIMUM STAGE IS 1077.3

MAXIMUM STAGE IS 1078.7

MAXIMUM STAGE IS 1079.6

MAXIMUM STAGE IS 1080.5

MAXIMUM STAGE IS 1081.2

MAXIMUM STAGE IS 1081.9

MAXIMUM STAGE IS 1082.5

MAXIMUM STAGE IS 1083.7

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 7 (CANADA LAKE AREA)

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
700	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	0	41.00	0.00	288.00	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	18.90	70.00	84.00	96.00	101.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.890

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.07	0.00	0.06

UNIT HYDROGRAPH DATA

TC= 10.37 R= 27.39 NTA= 1

RECESSION DATA
STRTG= 53.00 QRCSN= 420.00 RTIOR= 1.30

UNIT HYDROGRAPH 100 END-OF-PERIOD ORDINATES, LAG= 10.30 HOURS, CP= 0.30 VOL= 0.97

20.	76.	158.	256.	367.	484.	592.	681.	748.	790.
794.	770.	743.	716.	690.	665.	642.	619.	596.	575.
554.	535.	515.	497.	479.	462.	445.	429.	414.	399.
385.	371.	356.	345.	333.	321.	309.	298.	287.	277.
267.	258.	248.	239.	231.	223.	215.	207.	199.	192.
185.	179.	172.	166.	160.	154.	149.	144.	138.	133.
129.	124.	120.	115.	111.	107.	103.	100.	96.	93.
89.	86.	83.	80.	77.	74.	72.	69.	67.	64.
62.	60.	58.	56.	54.	52.	50.	48.	46.	45.
43.	41.	40.	39.	37.	36.	35.	33.	32.	31.

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	16.98	14.44	2.54	314200.
										(431.)	(367.)	(65.)	(8897.14)

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HYDROGRAPH ROUTING

ROUTE THROUGH CANADA LAKE - STEWART'S LANDING DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
700	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1542.	-1

STAGE	1542.40	1543.40	1544.40	1545.40	1546.40	1547.40	1548.40	1549.40	1550.40
	1554.40	1556.40	1558.40	1560.40					
FLOW	0.00	403.00	1140.00	2100.00	3245.00	4555.00	6075.00	7880.00	9975.00
	20220.00	26275.00	32100.00	38300.00					
CAPACITY=	0.	925.	4030.	10215.	12260.	14730.	20225.	26760.	34385.
ELEVATION=	1508.	1520.	1530.	1540.	1542.	1545.	1550.	1555.	1560.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1542.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXFD	DAMWID
1550.4	2.6	1.5	360.

PEAK OUTFLOW IS 1227. AT TIME 66.00 HOURS

PEAK OUTFLOW IS 1952. AT TIME 65.00 HOURS

PEAK OUTFLOW IS 2692. AT TIME 64.00 HOURS

PEAK OUTFLOW IS 3449. AT TIME 63.00 HOURS

PEAK OUTFLOW IS 4234. AT TIME 63.00 HOURS

PEAK OUTFLOW IS 5055. AT TIME 62.00 HOURS

PEAK OUTFLOW IS 5878. AT TIME 61.00 HOURS

PEAK OUTFLOW IS 7636. AT TIME 60.00 HOURS

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HYDROGRAPH ROUTING

ROUTE TO SUBAREA 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
347	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0800	0.0350	0.0800	1142.0	1180.0	70400.	0.01200

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

100.00 1160.00 180.00 1160.00 220.00 1145.00 227.50 1142.00 252.50 1142.00
260.00 1145.00 340.00 1160.00 390.00 1180.00

STORAGE	0.00	96.97	228.69	409.79	642.42	926.87	1263.03	1650.91	2090.50
	3129.00	3706.25	4322.42	4986.67	5692.93	6441.21	7231.51	8063.84	8938.18

OUTFLOW	[illegible]	395.01	1438.08	3171.57	5554.40	8615.70	12389.21	16910.63	22216.31
	35443.23	43417.03	52280.16	62051.77	72752.77	84405.14	97031.56	110655.03	125298.83
STAGE	1142.00	1144.00	1146.00	1148.00	1150.00	1152.00	1154.00	1156.00	1158.00
	1162.00	1164.00	1166.00	1168.00	1170.00	1172.00	1174.00	1176.00	1178.00
FLOW	0.00	395.01	1438.08	3171.57	5554.40	8615.70	12389.21	16910.60	22216.31
	35443.23	43417.03	52280.16	62051.77	72752.77	84405.14	97031.56	110655.03	125298.83

MAXIMUM STAGE IS 1145.6

MAXIMUM STAGE IS 1146.6

MAXIMUM STAGE IS 1147.4

MAXIMUM STAGE IS 1148.2

MAXIMUM STAGE IS 1148.9

MAXIMUM STAGE IS 1149.6

MAXIMUM STAGE IS 1150.2

MAXIMUM STAGE IS 1151.3

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 6

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
800	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	0	19.00	0.00	288.00	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	18.90	70.00	84.00	96.00	101.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.890

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
1	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.07	0.00	0.01

UNIT HYDROGRAPH DATA

TC= 9.94 R= 8.07 NTA= 0

RECESSION DATA

STRTQ= 21.0C QRCSN= 200.00 RTIOR= 1.30

UNIT HYDROGRAPH 49 END-OF-PERIOD ORDINATES, LAG= 3.7C HOURS, CP= 0.64 VOL= 1.CC

3c.	120.	241.	380.	529.	671.	785.	858.	891.	875.
802.	708.	626.	553.	488.	431.	381.	336.	297.	263.
232.	205.	181.	160.	141.	125.	110.	97.	86.	76.
67.	59.	52.	46.	41.	36.	32.	28.	25.	22.
19.	17.	15.	13.	12.	10.	9.	8.	7.	

END-OF-PERIOD FLOW

O MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	16.98	14.29	2.69	175731.
										(431.)(363.)(68.)(4976.14)			

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HYDROGRAPH ROUTING

ROUTE TO SUBAREA 3

ISTAQ	ICOPP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3c6	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0810	0.0350	0.0800	911.0	940.0	24000.	0.00800

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

100.00 940.00 220.00 920.00 280.00 915.00 290.00 911.00 350.00 911.00
360.00 915.00 440.00 920.00 540.00 940.00

STORAGE	0.00	53.66	113.74	182.36	281.23	416.03	586.66	780.17	987.80
	1445.42	1695.41	1959.51	2237.73	2530.07	2836.53	3157.10	3491.79	3840.69
OUTFLOW	0.00	470.23	1524.49	3135.06	5426.03	8403.28	12156.57	16820.64	22254.00
	35400.19	43116.66	51604.11	60871.69	70929.91	81790.38	93465.25	105967.11	119309.14

STAGE	911.0. 920.26	912.55 927.79	914.05 929.31	915.56 930.84	917.10 932.37	916.63 933.89	920.16 935.42	921.68 936.95	923.21 938.47
FLOW	0.00 35400.19	470.23 43116.68	1524.49 51604.11	3135.06 60871.69	5426.03 70929.91	8403.28 81790.38	12156.57 93465.25	16820.64 105967.11	22254.00 119309.14

MAXIMUM STAGE IS 914.6

MAXIMUM STAGE IS 915.6

MAXIMUM STAGE IS 916.3

MAXIMUM STAGE IS 917.1

MAXIMUM STAGE IS 917.6

MAXIMUM STAGE IS 918.2

MAXIMUM STAGE IS 918.7

MAXIMUM STAGE IS 919.6

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COMBINE HYDROGRAPHS

COMBINE 5 HYDROGRAPHS AT DOLGEVILLE 2+3+6+7+8=3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
300	5	0	0	0	0	1	0	0

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HYDROGRAPH ROUTING

ROUTE OVER DOLGEVILLE DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
303	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-734.	-1

STAGE	734.00 748.93	734.80 751.97	735.20 754.98	735.60 757.93	736.40 760.98	737.20 763.93	738.40 765.98	739.93 770.98	.90 775.98

FLOW=	0.00	501.00	862.00	1377.00	2258.00	3258.00	5308.00	8172.00	15013.00
	32304.00	42464.00	53511.00	65378.00	78012.00	91368.00	100656.00	125146.00	151352.00
CAPACITY=	0.	30.	68.	113.	166.	229.	302.	481.	588.	710.
	1000.	1173.	1366.	1816.	2275.	2358.	2951.	3286.	3640.	4030.
ELEVATION=	734.	736.	738.	740.	742.	744.	746.	750.	752.	754.
	756.	758.	762.	766.	768.	770.	774.	776.	778.	780.

CREL	SPWID	COGW	EXPW	ELEVL	COGL	CAREA	EXPL
734.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COGD	EXPD	DAMWID
740.0	2.6	1.5	50.

PEAK OUTFLOW IS 21274. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 32108. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 42995. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 53975. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 64965. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 76022. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 86973. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 108937. AT TIME 50.00 HOURS

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 4

ISTAQ	ICOPP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
400	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	0	15.40	0.00	288.00	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	18.90	70.00	84.00	96.00	101.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .89

LOSS DATA

LKOPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
1	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.07	0.00	0.02

UNIT HYDROGRAPH DATA

TC= 9.76 R= 11.32 NTA= 0

RECESSION DATA

STRTQ= 13.00 QRCSN= 150.00 RTIOR= 1.30

UNIT HYDROGRAPH 66 END-OF-PERIOD ORDINATES, LAG= 9.09 HOURS, CP= 0.53 VOL= 1.00

19.	73.	149.	237.	333.	427.	504.	558.	587.	583.
547.	500.	458.	419.	384.	351.	322.	294.	270.	247.
226.	207.	189.	173.	159.	145.	133.	122.	111.	102.
93.	85.	78.	72.	66.	60.	55.	50.	46.	42.
39.	35.	32.	30.	27.	25.	23.	21.	19.	17.
16.	15.	13.	12.	11.	10.	9.	9.	8.	7.
7.	6.	6.	5.	5.	4.				

0

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	16.98	14.32	2.66	140358.
										(431.)	(364.)	(68.)	(3974.49)

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COMBINE HYDROGRAPHS

COMBINE 2 HYDROGRAPHS 3+4=4

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
400	2	0	0	0	0	1	0	0

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HYDROGRAPH ROUTING

ROUTE THRU KYSER LAKE AND OVER INGHAMS DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
403	1	0	0	0	0	1	0	1

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1		2	0.000	0.000	0.000	-662.	-1

STAGE	657.3	659.00	660.00	661.00	661.66	662.00	663.00	664.00	665.80
	667.00	669.00	670.00	672.00	673.00	675.00	677.00	680.00	685.00
FLOW	1.00	1500.00	3000.00	5500.00	7600.00	8200.00	11500.00	14700.00	21000.00
	25400.00	33700.00	38200.00	47800.00	53000.00	64200.00	76200.00	94300.00	127100.00
CAPACITY=	0.	356.	826.	1330.	1910.	2300.	3080.	3860.	4180.	4670.
	5180.	5580.	5950.	6400.	6900.	7380.	7820.	9170.	10500.	12000.
ELEVATION=	634.	638.	642.	646.	650.	654.	657.	662.	664.	666.
	668.	670.	672.	674.	676.	678.	680.	685.	690.	695.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
657.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
665.8	2.6	1.5	480.

PEAK OUTFLOW IS 22566. AT TIME 51.00 HOURS

PEAK OUTFLOW IS 34098. AT TIME 51.00 HOURS

PEAK OUTFLOW IS 45642. AT TIME 51.00 HOURS

PEAK OUTFLOW IS 57273. AT TIME 51.00 HOURS

PEAK OUTFLOW IS 68912. AT TIME 51.00 HOURS

PEAK OUTFLOW IS 81595. AT TIME 51.00 HOURS

PEAK OUTFLOW IS 92243. AT TIME 51.00 HOURS

PEAK OUTFLOW IS 115546. AT TIME 51.00 HOURS

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HYDROGRAPH ROUTING

ROUTE TO SUBAREA 5

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
504	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0800	0.0350	0.0800	509.6	540.0	8400.	0.0100

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

100.00 540.00 300.00 520.00 380.00 515.00 395.00 509.00 545.00 565.00
560.00 515.00 800.00 520.00 116.00 540.00

STORAGE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OUTFLOW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STAGE	509.00	510.63	512.26	513.89	515.53	517.16	518.79	520.42	522.05
	525.31	526.95	528.58	530.21	531.84	533.47	535.10	536.74	536.37
FLOW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MAXIMUM STAGE IS 2266.6

MAXIMUM STAGE IS 3192.9

MAXIMUM STAGE IS 4194.8

MAXIMUM STAGE IS 5201.6

MAXIMUM STAGE IS 5910.7

MAXIMUM STAGE IS 6821.5

MAXIMUM STAGE IS 7734.1

MAXIMUM STAGE IS 9549.9

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 5

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
5	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	[illegible]	12.20	0.00	288.00	0.00	0.000	[illegible]	1	[illegible]

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	18.90	72.00	84.00	96.00	101.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.890

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
[illegible]	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.07	0.00	0.02

UNIT HYDROGRAPH DATA

TC= 9.12 R= 12.27 NTA= 0

RECESSION DATA

STRTQ= 5.00 QRCSN= 120.00 RTIOR= 1.30

UNIT HYDROGRAPH 70 END-OF-PERIOD ORDINATES, LAG= 8.56 HOURS, CP= 0.48 VOL= 1.00

16.	59.	121.	193.	272.	345.	401.	438.	452.	436.
402.	371.	342.	315.	290.	267.	247.	227.	209.	193.
176.	164.	151.	139.	128.	118.	109.	101.	93.	85.
79.	73.	67.	62.	57.	52.	48.	44.	41.	38.
35.	32.	30.	27.	25.	23.	21.	20.	18.	17.
15.	14.	13.	12.	11.	10.	9.	9.	8.	7.
7.	6.	6.	5.	5.	5.	4.	4.	4.	3.

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	16.98	14.33	2.65	110509.
										(431.)	(364.)	(67.)	(3129.26)

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COMBINE HYDROGRAPHS

COMBINE 2 HYDROGRAPHS 4+5=5 TOTAL INFLOW TO EAST CANADA LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
500	2	0	0	0	0	1	0	0

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HYDROGRAPH ROUTING

ROUTE THROUGH RESERVOIR AND OVER BEARDSLEE FALLS DAM

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
5 0	1	0	0	0	0	1	0	0

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-499.	-1

STAGE	498.50	499.00	500.00	501.00	502.00	504.00	505.00	506.50	508.00
	512.00	514.00	516.00						
FLOW	0.00	1525.00	2935.00	14315.00	28490.00	36560.00	41830.00	48790.00	57115.00
	84275.00	99830.00	116510.00						
CAPACITY=	0.	5.	34.	103.	223.	395.	619.	906.	1262.	1704.
	2280.	2487.	3046.	4004.	5485.	5866.	6408.	7948.	9756.	
ELEVATION=	443.	445.	450.	455.	460.	465.	470.	475.	480.	485.
	490.	492.	495.	500.	507.	508.	510.	515.	520.	

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
498.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
508.0	2.6	1.5	900.

PEAK OUTFLOW IS 22735. AT TIME 52.00 HOURS

PEAK OUTFLOW IS 34346. AT TIME 53.00 HOURS

PEAK OUTFLOW IS 46124. AT TIME 53.00 HOURS

PEAK OUTFLOW IS 57772. AT TIME 52.00 HOURS

PEAK OUTFLOW IS 69820. AT TIME 52.00 HOURS

PEAK OUTFLOW IS 81664. AT TIME 52.00 HOURS

PEAK OUTFLOW IS 93549. AT TIME 52.00 HOURS

PEAK OUTFLOW IS 117190. AT TIME 52.00 HOURS

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... AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

				RATIOS APPLIED TO FLOWS							
	STATION	AREA	PLAN	RATIO 1 0.20	RATIO 2 0.30	RATIO 3 0.40	RATIO 4 0.50	RATIO 5 0.60	RATIO 6 0.70	RATIO 7 0.80	RATIO 8 1.00
... AT	100	38.50	1	4028.	6042.	8056.	10070.	12084.	14098.	16112.	20139.
		(99.71)		(114.06)(	171.09)(	228.11)(	285.14)(	342.17)(	399.20)(	456.23)(	570.28)
	2..	38.50	1	4006.	6009.	8011.	10014.	12017.	14020.	16023.	20031.
		(99.71)		(113.45)(	170.14)(	226.85)(	283.56)(	340.29)(	397.01)(	453.72)(	567.21)
...RAPH AT	200	61.45	1	4710.	7065.	9420.	11776.	14131.	16486.	18841.	23551.
		(159.15)		(133.38)(	200.07)(	266.76)(	333.45)(	400.14)(	466.83)(	533.51)(	666.89)
...ED	...	99.95	1	8588.	12885.	17180.	21476.	25769.	30063.	34358.	42942.
		(258.87)		(243.19)(	364.85)(	486.50)(	608.12)(	729.69)(	851.30)(	972.91)(	1215.98)
...	302	99.95	1	8474.	12724.	16976.	21226.	25477.	29732.	33981.	42432.
		(258.87)		(239.95)(	360.31)(	480.72)(	601.04)(	721.43)(	841.91)(	962.22)(	1201.53)
...RAPH AT	3..	54.20	1	6427.	9641.	12855.	16068.	19282.	22496.	25709.	32137.
		(140.38)		(182.00)(	273.00)(	364.00)(	455.00)(	546.01)(	637.01)(	728.01)(	910.01)
...GRAPH AT	600	46.25	1	4667.	7000.	9334.	11667.	14000.	16334.	18667.	23334.
		(119.79)		(132.15)(	198.22)(	264.30)(	330.37)(	396.44)(	462.52)(	528.59)(	660.74)
...TED TO	306	46.25	1	4579.	6861.	9148.	11477.	13785.	16110.	18423.	23053.
		(119.79)		(129.66)(	194.28)(	259.03)(	324.98)(	390.34)(	456.18)(	521.67)(	652.79)
...OGRAPH AT	7..	41.00	1	2101.	3151.	4201.	5252.	6302.	7352.	8403.	10503.
		(106.19)		(59.48)(	89.23)(	118.97)(	148.71)(	178.45)(	208.20)(	237.94)(	297.42)
...TED TO	700	41.00	1	1227.	1952.	2692.	3449.	4234.	5055.	5878.	7636.
		(106.19)		(34.74)(	55.26)(	76.21)(	97.68)(	119.88)(	143.15)(	166.43)(	216.22)
...UTED TO	707	41.00	1	1222.	1947.	2684.	3439.	4223.	5059.	5862.	7610.
		(106.19)		(34.62)(	55.14)(	76.00)(	97.37)(	119.59)(	142.68)(	165.99)(	215.48)
...DROGRAPH AT	800	19.00	1	2157.	3235.	4314.	5392.	6471.	7549.	8628.	10784.
		(49.21)		(61.08)(	91.61)(	122.15)(	152.69)(	183.23)(	213.77)(	244.30)(	305.38)
...OUTED TO	3..	19.00	1	2143.	3214.	4285.	5356.	6422.	7492.	8562.	10702.

	(49.21)		(60.66)(	91.01)(	121.34)(	151.67)(	181.84)(	212.15)(	242.45)(	303.05)
5 COMBINED	30. 260.40	1	21308.	32169.	43062.	54057.	65101.	76164.	87196.	109223.
	(674.43)		(603.58)(	910.91)(	1219.37)(	1530.72)(	1843.44)(	2156.71)(	2469.12)(	3092.84)
ROUTED TO	303 260.40	1	21274.	32118.	42995.	53975.	64965.	76022.	86973.	108937.
	(674.43)		(602.43)(	909.21)(	1217.48)(	1528.39)(	1839.61)(	2152.70)(	2462.79)(	3084.76)
HYDROGRAPH AT	40. 15.40	1	1458.	2187.	2916.	3645.	4374.	5103.	5832.	7290.
	(39.69)		(41.29)(	61.95)(	82.57)(	103.22)(	123.86)(	144.51)(	165.15)(	206.44)
2 COMBINED	403 275.80	1	22655.	34179.	45756.	57426.	69107.	80854.	92495.	115840.
	(714.31)		(641.52)(	967.84)(	1295.66)(	1626.11)(	1956.88)(	2289.52)(	2619.15)(	3280.22)
ROUTED TO	493 275.80	1	22566.	34098.	45642.	57273.	68912.	80595.	92243.	115546.
	(714.31)		(638.99)(	965.55)(	1292.44)(	1621.79)(	1951.38)(	2282.18)(	2612.04)(	3271.89)
ROUTED TO	504 275.80	1	21876.	33213.	44500.	55844.	67217.	78613.	90033.	112753.
	(714.31)		(619.46)(	940.48)(	1260.09)(	1581.31)(	1903.37)(	2226.08)(	2549.45)(	3192.80)
HYDROGRAPH AT	500 12.20	1	1116.	1674.	2232.	2790.	3348.	3905.	4463.	5579.
	(31.60)		(31.60)(	47.40)(	63.19)(	78.99)(	94.79)(	110.59)(	126.39)(	157.99)
2 COMBINED	5[illegible] 288.00	1	22781.	34570.	46310.	58106.	69932.	81781.	93653.	117278.
	(745.91)		(645.09)(	978.92)(	1311.35)(	1645.38)(	1980.25)(	2315.78)(	2651.96)(	3320.94)
ROUTED TO	5[illegible] 288.00	1	22735.	34346.	46024.	57772.	69820.	81684.	93549.	117190.
	(745.91)		(643.78)(	972.58)(	1303.24)(	1635.92)(	1977.07)(	2313.02)(	2649.02)(	3318.46)

PLAN 1 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	4006.	1131.3	50.00
0.30	6009.	1132.5	50.00
0.40	8011.	1133.5	50.00
0.50	10014.	1134.4	50.00
0.60	12017.	1135.2	50.00
0.70	14020.	1135.8	50.00
0.80	16023.	1136.5	50.00
1.00	20031.	1137.7	50.00

PLAN 1 STATION 302

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	8474.	1[illegible].8	52.[illegible]
0.30	12724.	1[illegible].[illegible]	52.[illegible]

[illegible]	16476.	1015.8	52.00
0.50	21226.	1015.4	52.00
0.60	25477.	1016.9	52.00
0.70	29732.	1018.2	52.00
0.80	33981.	1019.4	52.00
1.00	42432.	1021.7	52.00

PLAN 1 STATION 306

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	4579.	1077.3	51.00
0.30	6861.	1078.7	51.00
0.40	9148.	1079.6	51.00
0.50	11477.	1080.5	51.00
0.60	13785.	1081.2	51.00
0.70	16110.	1081.9	51.00
0.80	18423.	1082.5	51.00
1.00	23053.	1083.7	51.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1542.40	1542.40	1550.40
STORAGE	12260.	12260.	20748.
OUTFLOW	0.	0.	9975.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.20	1544.49	0.00	14246.	1227.	0.00	66.00	0.00
0.30	1545.25	0.00	15000.	1952.	0.00	65.00	0.00
0.40	1545.92	0.00	15737.	2692.	0.00	64.00	0.00
0.50	1546.56	0.00	16440.	3449.	0.00	63.00	0.00
0.60	1547.15	0.00	17098.	4234.	0.00	63.00	0.00
0.70	1547.73	0.00	17729.	5055.	0.00	62.00	0.00
0.80	1548.27	0.00	18324.	5878.	0.00	61.00	0.00
1.00	1549.26	0.00	19417.	7636.	0.00	60.00	0.00

PLAN 1 STATION 307

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	1222.	1145.6	68.00
0.30	1947.	1146.6	66.00
0.40	2684.	1147.4	65.00
0.50	3439.	1148.2	64.00
0.60	4223.	1148.9	64.00
0.70	5039.	1149.6	63.00
0.80	5862.	1150.2	63.00
1.00	7610.	1151.3	62.00

PLAN 1 STATION 308

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	2143.	914.6	48.00
0.30	3214.	915.6	48.00
0.40	4285.	916.3	48.00
0.50	5356.	917.1	48.00
0.60	6422.	917.6	48.00
0.70	7492.	918.2	48.00
0.80	8562.	918.7	48.00
1.00	10702.	919.6	48.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	734.00	734.00	743.00
STORAGE	0.	0.	113.
OUTFLOW	0.	0.	8400.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.20	744.72	4.72	255.	21274.	20.00	50.00	0.00
0.30	747.88	7.88	386.	32108.	27.00	50.00	0.00
0.40	750.69	10.69	516.	42495.	31.00	50.00	0.00
0.50	753.24	13.24	646.	53575.	36.00	50.00	0.00
0.60	755.71	15.71	854.	64965.	38.00	50.00	0.00
0.70	758.02	18.02	1002.	76922.	42.00	50.00	0.00
0.80	760.18	20.18	1190.	86973.	44.00	50.00	0.00
1.00	764.27	24.27	1622.	108937.	49.00	50.00	0.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	661.80	657.30	685.80
STORAGE	3860.	3860.	4621.
OUTFLOW	7600.	0.	21300.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.20	666.16	0.36	4703.	22566.	5.00	51.00	0.00
0.30	668.06	2.26	5092.	34098.	13.00	51.00	0.00
0.40	669.58	3.78	5411.	45642.	18.00	51.00	0.00
0.50	670.91	5.11	5705.	57273.	21.00	51.00	0.00
0.60	672.15	6.35	5983.	68912.	24.00	51.00	0.00
0.70	673.28	7.48	6238.	80595.	27.00	51.00	0.00
0.80	674.34	8.54	6485.	92243.	29.00	51.00	0.00
1.00	676.32	10.52	6977.	115546.	33.00	51.00	0.00

PLAN 1 STATION 504

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	21876.	2286.8	52.00
0.30	33213.	3192.9	52.00
0.40	44500.	4094.8	52.00
0.50	55844.	5001.6	52.00
0.60	67217.	5910.7	52.00
0.70	78613.	6821.5	52.00
0.80	90033.	7734.1	52.00
1.00	112753.	9549.9	52.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	498.50	498.50	508.00
STORAGE	3717.	3717.	5866.
OUTFLOW	0.	0.	57115.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.20	501.59	0.00	4367.	22735.	0.00	52.00	0.00
0.30	503.45	0.00	4799.	34346.	0.00	53.00	0.00
0.40	505.60	0.00	5349.	46024.	0.00	53.00	0.00
0.50	508.09	0.09	5891.	57772.	2.00	52.00	0.00
0.60	509.36	1.36	6234.	69820.	9.00	52.00	0.00
0.70	510.46	2.46	6531.	81684.	11.00	52.00	0.00
0.80	511.30	3.30	6808.	93549.	14.00	52.00	0.00
1.00	512.90	4.90	7302.	117190.	18.00	52.00	0.00

(0001)	A1	HEARDSLEE FALLS DAM FILE IS A62K-F									
(0002)	A2	HEC-1DB (CLARK PARAMETERS)									
(0003)	A3	0.5 PMF - DAM BREAK ANALYSIS									
(0004)	B	3.0	0	15	0	0	0	0	0	4	0
(0005)	B1	5	0	0	0	0	0	0	0	0	0
(0006)	J	9	1	1	0	0	0	0	0	0	0
(0007)	J1	0.5									
(0008)	K	0	100	0	0	0	0	1	0	0	0
(0009)	K1	RUNOFF SUBAREA 1									
(0010)	M	1	0	38.5	0	288	0	0	0	1	0
(0011)	P	0	18.9	70	84	96	101	0	0	0	0
(0012)	T	0	0	0	0	0	0	1.0	0.075	0	0.007
(0013)	V	11.82	8.57								
(0014)	X	49.0	400	1.3							
(0015)	K	1	200	0	0	0	0	1	0	0	0
(0016)	K1	ROUTE TO SUBAREA 2									
(0017)	Y	0	0	0	1	1	0	0	0	0	0
(0018)	Y1	1	0	0	0	0	0	-1	0	0	0
(0019)	Y6	0.08	0.035	0.08	1126	1160	34400	0.015	0	0	0
(0020)	Y7	100	1160	160	1140	300	1130	310	1126	350	1126
(0021)	Y7	300	1130	430	1140	490	1160	0	0	0	0
(0022)	K	1	200	0	0	0	0	1	0	0	0
(0023)	K1	RUNOFF SUBAREA 2									
(0024)	M	1	0	61.45	0	288	0	0	0	1	0
(0025)	P	0	18.9	70	84	96	101	0	0	0	0
(0026)	T	0	0	0	0	0	0	1.0	0.075	0	0.018
(0027)	V	14.35	13.80								
(0028)	X	85.0	625	1.3							
(0029)	K	2	200	0	0	0	0	1	0	0	0
(0030)	K1	COMBINE 2 HYDROGRAPHS 1+2=2									
(0031)	K	1	302	0	0	0	0	1	0	0	0
(0032)	K1	ROUTE TO SUBAREA 3									
(0033)	Y	0	0	0	1	1	0	0	0	0	0
(0034)	Y1	1	0	0	0	0	0	-1	0	0	0
(0035)	Y6	0.08	0.035	0.08	1091	1040	55200	0.035	0	0	0
(0036)	Y7	100	1040	300	1020	440	1005	450	1001	510	1001
(0037)	Y7	520	1005	630	1021	760	1040	0	0	0	0
(0038)	K	3			0	0	0	1	0	0	0

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(0039)   K1       RUNOFF SUBAREA 3
(0040)   M        1          0      54.2          0        268          0          0          0          1          0
(0041)   P        0       18.9         7         84         96        101          0          0          0          0
(0042)   T        0          0          0          0          0          0        1.0      0.075          0      0.001
(0043)   V    11.80       6.46
(0044)   X    74.3        550        1.3
(0045)   K        0        600          0          0          0          0          1          0          0          0
(0046)   K1       RUNOFF SUBAREA 6
(0047)   M        1          0      46.25          0        268          0          0          0          1          0
(0048)   P        0       18.9         70         84         96        101          0          0          0          0
(0049)   T        0          0          0          0          0          0        1.0      0.075          0      0.007
(0050)   V    12.43       8.90
(0051)   X    61.0        470        1.3
(0052)   K        1        306          0          0          0          0          1          0          0          0
(0053)   K1       ROUTE TO SUBAREA 3
(0054)   Y        0          0          0          1          1          0          0          0          0          0
(0055)   Y1       1          0          0          0          0          0         -1          0          0          0
(0056)   Y6    0.08      0.035       0.08       1071       1100      42400      0.009          0          0          0
(0057)   Y7     100       1100        140       1080        260       1075        270       1071        310       1071
(0058)   Y7     320       1075        420       1080        580       1100          0          0          0          0
(0059)   K        0        700          0          0          0          0          1          0          0          0
(0060)   K1       RUNOFF SUBAREA 7 (CANADA LAKE AREA)
(0061)   M        1          0      41.00          0        288          0          0          0          1          0
(0062)   P        0       18.9         70         84         96        101          0          0          0          0
(0063)   T        0          0          0          0          0          0        1.0      0.075          0      0.063
(0064)   V    10.37      27.39
(0065)   X    53.0        420        1.3
(0066)   K        1        700          0          0          0          0          1          0          0          0
(0067)   K1       ROUTE THROUGH CANADA LAKE - STEWART'S LANDING DAM
(0068)   Y        1          0          0          1          1          0          0          0          0          0
(0069)   Y1       1          0          0          0          0          0    -1542.4         -1          0          0
(0070)   Y41542.4   1543.4     1544.4     1545.4     1546.4     1547.4     1548.4     1549.4     1550.4     1552.4
(0071)   Y41554.4   1556.4     1558.4     1560.4          0          0          0          0          0          0
(0072)   Y5       0        403       1140       2100       3245       4555       6075       7880       9975      14900
(0073)   Y5   20220      26275      32130      38300          0          0          0          0          0          0
(0074)   $S       0        925       4030      10215      12260      14730      20225      26760      34385          0
(0075)   $E1508.4   1520       1535       1540       1542.4     1545       1550       1555       1560          0
(0076)   $$1542.4          0          0          0          0          0          0          0          0          0
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(0077)  $D1550.4    2.65      1.5       30        0         0         0         0         0         0
(0078)  K       1     307                 0        0         0         1         0         0         0
(0079)  K1          ROUTE TO SUBAREA 3
(0080)  Y       0       0         0         1         1         0         0         0         0         0
(0081)  Y1      1       0         0         0         0         0        -1         0         0         0
(0082)  Y6   0.08   0.035      0.08      1142      1180     70400     0.012         0         0         0
(0083)  Y7    100    1180       180      1160       220      1145     227.5      1142     252.5      1142
(0084)  Y7    260    1145       340      1160       390      1180         0         0         0         0
(0085)  K       0     800         0         0         0         0         1         0         0         0
(0086)  K1          RUNOFF SUBAREA 8
(0087)  M       1       0     19.00         0       288         0         0         0         1         0
(0088)  P       0    18.9        70        84        96       101         0         0         0         0
(0089)  T       0       0         0         0         0         0       1.0     0.075         0     0.008
(0090)  V    9.94    8.07
(0091)  X    21.0     200       1.3
(0092)  K       1     308         0         0         0         0         1         0         0         0
(0093)  K1          ROUTE TO SUBAREA 3
(0094)  Y       0       0         0         1         1         0         0         0         0         0
(0095)  Y1      1       0         0         0         0         0        -1         0         0         0
(0096)  Y6   0.08   0.035      0.08       911       940     24000     0.036         0         0         0
(0097)  Y7    100     940       220       920       280       915       290       911       350       911
(0098)  Y7    360     915       440       920       540       940         0         0         0         0
(0099)  K       5     300         0         0         0         0         1         0         0         0
(0100)  K1          COMBINE 5 HYDROGRAPHS AT DOLGEVILLE 2+3+6+7+8=3
(0101)  K       1     303         0         0         0         0         1         0         0         0
(0102)  K1          ROUTE OVER DOLGEVILLE DAM
(0103)  Y       0       0         0         1         1         0         0         0         0         0
(0104)  Y1      1       0         0         0         0         0      -734        -1         0         0
(0105)  Y4    734   734.6     735.2     735.6     736.4     737.2     738.4     739.9     742.9     745.9
(0106)  Y4  748.9   751.9     754.9     757.9     760.9     763.9     765.9     770.9     775.9     780.9
(0107)  Y5      0     501       882      1377      2238      3258      5308      8172     15013     23115
(0108)  Y5  32304   42464     53511     65376     78012     91368    106656    125146    151352    179168
(0109)  $S      0      30        68       113       166       229       302       481       588       710
(0110)  $S   1000    1173      1366      1816      2075      2358      2951      3286      3640      4030
(0111)  $E    734     736       738       740       742       744       746       750       752       754
(0112)  $E    756     760       762       766       768       770       774       776       778       780
(0113)  $$    734       0         0         0         0         0         0         0         0         0
(0114)  $D    740    2.65       1.5        50        0         0         0         0         0         0
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(0115)   K                 400          0          0          0          1          0          0          0
(0116)   K1          RUNOFF SUBAREA 4
(0117)   M       1          0       15.4          0        288          0          0          0          1          0
(0118)   P       0       18.9         70         84         96        101          0          0          0          0
(0119)   T       0          0          0          0          0          0        1.0      0.075          0      0.018
(0120)   V    9.76      11.32
(0121)   X    13.0        150        1.3
(0122)   K       2        400          0          0          0          0          1          0          0          0
(0123)   K1          COMBINE 2 HYDROGRAPHS 3+4=4
(0124)   K       1        403          0          0          0          0          1          0          0          0
(0125)   K1          ROUTE THRU KYSER LAKE AND OVER INGHAMS DAM
(0126)   Y       0          0          0          1          1          0          0          0          0          0
(0127)   Y1      1          0          0          0          0          0     -661.8         -1          0          0
(0128)   Y4  657.3      659.0        660        661      661.8        662        663        664      665.8        666
(0129)   Y4    667        669        670        672        673        675        677        680        685        690
(0130)   Y5      0       1500       3000       5500       7600       8200      11500      14700      21000      21700
(0131)   Y5  25400      33700      38200      47800      53000      64200      76200      94300     127100     163000
(0132)   $S      0        356        826       1330       1910       2300       3080       3860       4180       4670
(0133)   $S   5080       5500       5950       6400       6900       7380       7820       9170      10500      12000
(0134)   $E    634        638        642        646        650        654      657.3      661.8        664        666
(0135)   $E    668        670        672        674        676        678        680        685        690        695
(0136)   $$ 657.3          0          0          0          0          0          0          0          0          0
(0137)   $D 665.8       2.65        1.5        480          0          0          0          0          0          0
(0138)   K       1        504          0          0          0          0          1
(0139)   K1          ROUTE TO SUBAREA 5
(0140)   Y       0          0          0          1          1
(0141)   Y1      1          0          0          0          0          0         -1
(0142)   Y6   0.08      0.035       0.08        509        540       8400      0.010
(0143)   Y7    100        540         30        520        380        515        395        509        545        509
(0144)   Y7    560        515        800        520       1160        540
(0145)   K       1        500          0          0          0          0          1          0          0          0
(0146)   K1          RUNOFF SUBAREA 5
(0147)   M       1          0      12.20          0        288          0          0          0          1          0
(0148)   P       0       18.9         70         84         96        101          0          0          0          0
(0149)   T       0          0          0          0          0          0        1.0      0.075          0      0.023
(0150)   V    9.12      12.27
(0151)   X    5.0        120        1.3
(0152)   K       2        500          0          0          0          0          1          0          0          0
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(0153)   K1       COMBINE 2 HYDROGRAPHS 4+5=5 TOTAL INFLOW TO EAST CANADA LAKE
(0154)   K        1     500                 0     0     0     0     1     0     0
(0155)   K1       ROUTE THROUGH RESERVOIR AND OVER BEARDSLEE FALLS DAM
(0156)   Y        0     0     0     1     1     0     0     0     0     0
(0157)   Y1       1     0     0     0     0     0  -498.5    -1     0     0
(0158)   Y4   498.5   499   500   501   502   504   505   506.5   508   510
(0159)   Y4   512   514   516
(0160)   Y5   0     1525  2935  14315 28490 36560 41830 48790 57115 69955
(0161)   Y5   84275 99830 116510
(0162)   $S   0     5     34    103   223   395   619   906   1262  1704
(0163)   $S   2280  2487  3046  4004  5485  5866  6408  7948  9756
(0164)   $E   443   445   450   455   460   465   470   475   480   485
(0165)   $E   490   491.5 495   500   506.5 508   510   515   520
(0166)   $$   498.5 0     0     0     0     0     0     0     0     0
(0167)   $D   508   2.65  1.5   900   0     0     0     0     0     0
(0168)   $B   50    0.5   443   0.5   491.5 508.08
(0169)   $B   50    0.5   443   2     491.5 508.08
(0170)   $B   50    0.5   443   5     491.5 508.08
(0171)   $B   130   0.5   443   0.5   491.5 508.08
(0172)   $B   130   0.5   443   2     491.5 508.08
(0173)   $B   130   0.5   443   5     491.5 508.08
(0174)   $B   260   0.5   443   0.5   491.5 508.08
(0175)   $B   260   0.5   443   2     491.5 508.08
(0176)   $B   260   0.5   443   5     491.5 508.08
(0177)   K    1     3600                      1
(0178)   K1       CHANNEL ROUTE TO USGS GAGE
(0179)   Y                    1     1
(0180)   Y1       1                        -1
(0181)   Y6   0.07  0.035 0.07  331   360   3100  0.047
(0182)   Y7   100   360   140   340   180   335   190   331   290   331
(0183)   Y7   335   335   360   340   400   360
(0184)   K    1     6900                      2     1
(0185)   K1       CHANNEL ROUTE TO DOWNSTREAM HAZARD
(0186)   Y                    1     1
(0187)   Y1       1                        -1
(0188)   Y6   0.07  0.035 0.07  316   360   3300  0.0045
(0189)   Y7   100   360   160   340   640   320   650   316   810   316
(0190)   Y7   820   32    900   340   980   360
```
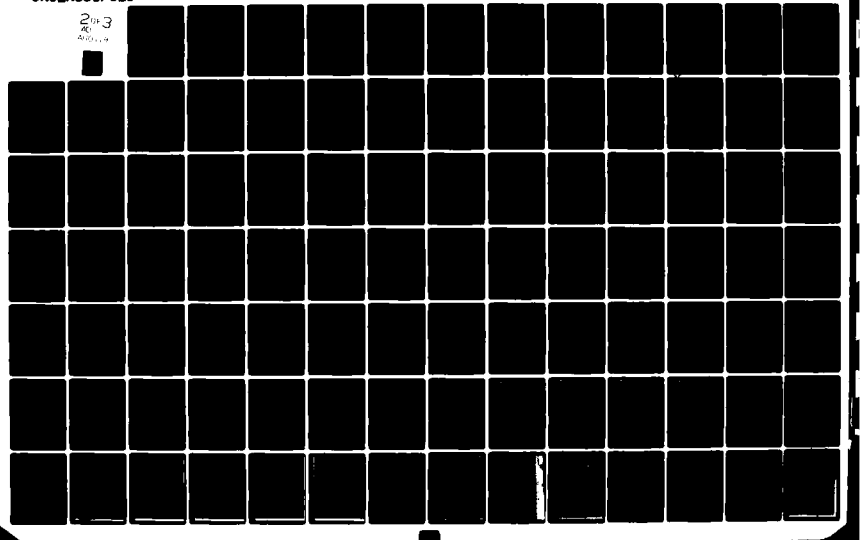
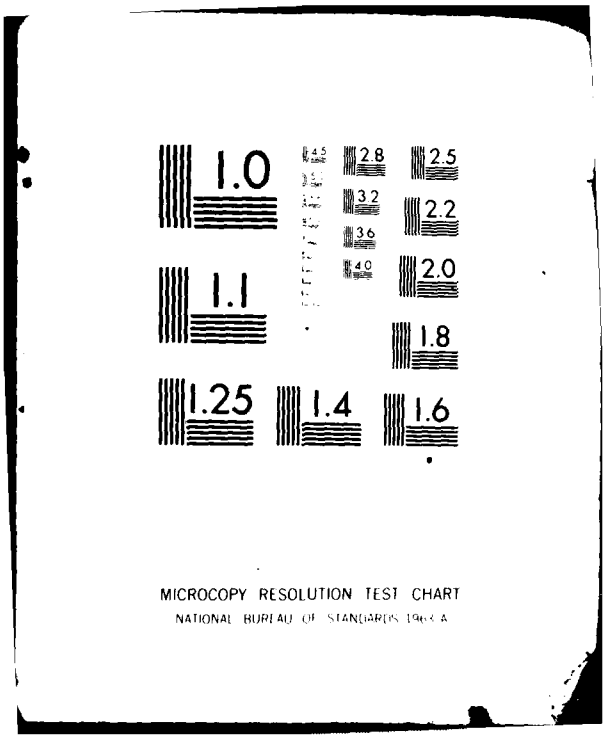

(0191) K 99 0 0 0 0 1 0 2 0 0
(0192) A
(0193) A
(0194) A
(0195) A
(0196) A

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	100
ROUTE HYDROGRAPH TO	200
RUNOFF HYDROGRAPH AT	200
COMBINE 2 HYDROGRAPHS AT	200
ROUTE HYDROGRAPH TO	302
RUNOFF HYDROGRAPH AT	300
RUNOFF HYDROGRAPH AT	600
ROUTE HYDROGRAPH TO	306
RUNOFF HYDROGRAPH AT	700
ROUTE HYDROGRAPH TO	700
ROUTE HYDROGRAPH TO	307
RUNOFF HYDROGRAPH AT	800
ROUTE HYDROGRAPH TO	308
COMBINE 5 HYDROGRAPHS AT	300
ROUTE HYDROGRAPH TO	303
RUNOFF HYDROGRAPH AT	400
COMBINE 2 HYDROGRAPHS AT	400
ROUTE HYDROGRAPH TO	403
ROUTE HYDROGRAPH TO	504
RUNOFF HYDROGRAPH AT	500
COMBINE 2 HYDROGRAPHS AT	500
ROUTE HYDROGRAPH TO	500
ROUTE HYDROGRAPH TO	3600
ROUTE HYDROGRAPH TO	6900
END OF NETWORK	

AD-A110 119 STETSON-DALE UTICA NY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. EAST CANADA LAKE DAM (INVENTORY NU--ETC(U)
SEP 81 J B STETSON DACW51-81-C-0009
UNCLASSIFIED NL

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1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********

RUN  DATE?SAT, AUG 29 1981
     TIME?11:54:25

                    BEARDSLEE FALLS DAM  FILE IS ABZK-F
                    HEC-1DB  (CLARK PARAMETERS)
                    0.5 PMF - DAM BREAK ANALYSIS

                                  JOB SPECIFICATION
        NS      NHR     NMIN     IDAY      IHR     IMIN    METRC     IPLT     IPRT    NSTAN
       300        0       15        0        0        0        0        0        4        0
                             JOPER      NWT   LROPT   TRACE
                                 5        0        0        0

                              MULTI-PLAN ANALYSES TO BE PERFORMED
                                  NPLAN= 9 NRTIO= 1 LRTIO= 1
                RTIOS=    0.50

**********          **********          **********          **********          **********

                                SUB-AREA RUNOFF COMPUTATION

                RUNOFF SUBAREA 1
                         ISTAQ   ICOMP   IECON   ITAPE   JPLT    JPRT    INAME   ISTAGE  IAUTO
                           100       0       0       0       0       0       1       0       0

                                  HYDROGRAPH DATA
              IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
                  1       0   38.50    0.00  288.00    0.00   0.000       0       1       0

                                  PRECIP DATA
                        SPFE     PMS      R6     R12     R24     R48     R72     R96
                        0.00   18.90   72.00   84.00   96.00  101.00    0.00    0.00
TRSPC COMPUTED BY THE PROGRAM IS 0.890

                                  LOSS DATA
           LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
               1    0.00    0.00    1.00    0.00    0.00    1.00    1.30    0.07    0.00    0.01

                                UNIT HYDROGRAPH DATA
```

TC= 11.82 R= 8.57 NIA=

RECESSION DATA
STRTQ= 49.00 QRCSN= 400.00 RTIOR= 1.30

UNIT HYDROGRAPH 100 END-OF-PERIOD ORDINATES, LAG= 10.67 HOURS, CP= 0.67 VOL= 0.89

6.	24.	49.	80.	115.	153.	194.	238.	284.	331.
381.	432.	484.	537.	591.	646.	702.	759.	816.	874.
932.	991.	1050.	1109.	1166.	1221.	1272.	1319.	1363.	1403.
1440.	1474.	1505.	1532.	1556.	1576.	1593.	1607.	1618.	1625.
1628.	1628.	1624.	1616.	1603.	1585.	1560.	1524.	1481.	1439.
1397.	1357.	1318.	1280.	1243.	1208.	1173.	1139.	1106.	1075.
1044.	1014.	984.	956.	929.	902.	876.	851.	826.	803.
780.	757.	735.	714.	694.	674.	654.	636.	617.	600.
582.	566.	549.	534.	518.	503.	489.	475.	461.	448.
435.	422.	410.	399.	387.	376.	365.	355.	344.	335.

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	16.98	14.29	2.69	1264730.
										(431.)	(363.)	(68.)	(35813.13)

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTE TO SUBAREA 2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
200	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

XN(1)	XN(2)	XN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0800	0.0350	0.0800	1126.0	1160.0	34400.	0.01500

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

STORAGE	0.00	62.84	138.33	236.60	382.53	575.89	817.56	1107.14	1444.36
	2192.50	2593.11	3011.43	3447.44	3901.16	4372.57	4861.66	5368.49	5893.00
OUTFLOW	0.00	568.34	1880.74	4089.52	7238.39	11389.39	16642.55	23092.23	30909.81
	51166.48	63157.77	76375.25	90816.59	106484.06	123383.16	141521.97	160910.44	181559.75
STAGE	1126.00	1127.79	1129.58	1131.37	1133.16	1134.95	1136.74	1138.53	1140.31
	1143.89	1145.66	1147.47	1149.26	1151.05	1152.84	1154.63	1156.42	1158.21
FLOW	0.00	568.34	1880.74	4089.52	7238.39	11389.39	16642.55	23092.23	30909.81
	51166.48	63157.77	76375.25	90816.59	106484.06	123383.16	141521.97	160910.44	181559.75

MAXIMUM STAGE IS 1134.4

MAXIMUM STAGE IS 1134.4

MAXIMUM STAGE IS 1134.4

MAXIMUM STAGE IS 1134.4

MAXIMUM STAGE IS 1134.4

MAXIMUM STAGE IS 1134.4

MAXIMUM STAGE IS 1134.4

MAXIMUM STAGE IS 1134.4

MAXIMUM STAGE IS 1134.4

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	3	61.45	0.00	288.00	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	16.90	7.00	84.00	96.00	101.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.89

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.07	0.00	0.02

UNIT HYDROGRAPH DATA
TC= 14.35 R= 13.50 NTA= 0

RECESSION DATA
STRTQ= 85.00 QRCSN= 625.00 RTIOR= 1.30

UNIT HYDROGRAPH 100 END-OF-PERIOD ORDINATES, LAG= 13.53 HOURS, CP= 0.60 VOL= 0.72

5.	18.	37.	60.	87.	116.	148.	182.	216.	256.
295.	336.	378.	421.	465.	511.	557.	604.	652.	701.
751.	801.	852.	903.	955.	1007.	1060.	1113.	1166.	1219.
1270.	1318.	1365.	1409.	1451.	1490.	1528.	1563.	1596.	1627.
1656.	1682.	1706.	1728.	1748.	1766.	1781.	1794.	1804.	1812.
1817.	1820.	1819.	1815.	1808.	1797.	1781.	1757.	1726.	1695.
1665.	1635.	1606.	1577.	1549.	1521.	1493.	1467.	1440.	1414.
1389.	1364.	1340.	1316.	1292.	1269.	1246.	1224.	1202.	1180.
1159.	1138.	1118.	1098.	1078.	1059.	1040.	1021.	1003.	985.
967.	950.	932.	916.	899.	883.	867.	852.	836.	821.

0

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	16.98	14.32	2.66	1636895.
										(431.)	(364.)	(68.)	(46351.66)

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COMBINE HYDROGRAPHS

COMBINE 2 HYDROGRAPHS 1+2=2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2 0	2	0	0	0	0	1	0	0

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTE TO SUBAREA 3

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3 2	1	0	0	0	0	1	0	1

ALL PLANS HAVE SAME
ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPRP		LSTR
0.0	0.000	0.00	1	1	0	0		0

	NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
	1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0800	0.0350	0.0800	1001.0	1040.0	55200.	0.00500

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
100.00 1040.00 380.00 1020.00 440.00 1005.00 450.00 1001.00 510.00 1001.00
520.00 1005.00 600.00 1020.00 760.00 1040.00

STORAGE	0.00	169.41	365.55	601.11	886.50	1221.72	1606.78	2041.66	2526.37
	3663.99	4382.29	5218.06	6171.22	7241.83	8429.88	9735.38	11158.33	12698.71
OUTFLOW	0.00	613.35	2015.54	4301.21	7331.70	11112.46	15657.03	20983.58	27113.10
	41516.96	50002.64	59709.42	70701.17	83056.33	96855.58	112179.19	129106.16	147713.50
STAGE	1001.00	1003.05	1005.11	1007.16	1009.21	1011.26	1013.32	1015.37	1017.42
	1021.53	1023.58	1025.63	1027.68	1029.74	1031.79	1033.84	1035.89	1037.95
FLOW	0.00	613.35	2015.54	4301.21	7331.70	11112.46	15657.03	20983.58	27113.10
	41516.96	50002.64	59709.42	70701.17	83056.33	96855.58	112179.19	129106.16	147713.50

MAXIMUM STAGE IS 1015.5

MAXIMUM STAGE IS 1015.5

MAXIMUM STAGE IS 1015.5

MAXIMUM STAGE IS 1015.5

MAXIMUM STAGE IS 1015.5

MAXIMUM STAGE IS 1015.5

MAXIMUM STAGE IS 1015.5

MAXIMUM STAGE IS 1015.5

MAXIMUM STAGE IS 1015.5

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
300	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	0	54.20	0.00	288.00	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	18.90	70.00	84.00	96.00	101.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.890

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
2	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.07	0.00	0.00

UNIT HYDROGRAPH DATA

TC= 11.80 R= 6.46 NTA= 0

RECESSION DATA

STRTQ= 74.00 QRCSN= 550.00 RTIOR= 1.30

UNIT HYDROGRAPH 100 END-OF-PERIOD ORDINATES, LAG= 10.13 HOURS, CP= 0.74 VOL= 0.94

12.	44.	91.	147.	211.	280.	355.	433.	515.	599.
686.	775.	866.	959.	1052.	1147.	1242.	1338.	1435.	1531.
1629.	1726.	1823.	1920.	2014.	2101.	2181.	2255.	2321.	2381.
2435.	2482.	2523.	2558.	2587.	2610.	2627.	2639.	2644.	2643.
2635.	2622.	2601.	2574.	2538.	2492.	2435.	2357.	2269.	2183.
2100.	2020.	1943.	1870.	1799.	1730.	1665.	1602.	1541.	1482.
1426.	1372.	1320.	1270.	1221.	1175.	1130.	1088.	1046.	1007.
968.	932.	896.	862.	829.	798.	768.	738.	710.	683.
658.	633.	609.	585.	563.	542.	521.	501.	482.	464.
447.	430.	413.	398.	382.	368.	354.	341.	328.	315.

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	16.98	14.28	2.71	1892700.
										(431.)	(363.)	(69.)	(53595.24)

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SUB-AREA RUNOFF COMPUTATION

KOUTE SUBAREA 6

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
6	1	0	0	1	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	3	46.25	0.00	288.00	0.00	0.000	1	1	0

PRECIP DATA

SPFE	PMS	Ro	R12	R24	R48	R72	R96
0.00	18.90	78.00	84.00	96.00	101.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.890

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.07	0.00	0.01

UNIT HYDROGRAPH DATA

TC= 12.43 R= 8.90 NTA= 0

RECESSION DATA

STRTQ= 61.00 QRCSN= 470.00 RTIOR= 1.30

UNIT HYDROGRAPH 100 END-OF-PERIOD ORDINATES, LAG= 11.20 HOURS, CP= 0.67 VOL= 0.87

7.	25.	53.	86.	123.	164.	209.	256.	305.	357.
413.	465.	521.	579.	638.	698.	758.	820.	882.	945.
1008.	1072.	1136.	1200.	1265.	1329.	1389.	1446.	1499.	1549.
1595.	1637.	1676.	1711.	1743.	1771.	1796.	1818.	1836.	1851.
1862.	1869.	1873.	1873.	1869.	1860.	1847.	1829.	1804.	1769.
1724.	1676.	1630.	1585.	1541.	1498.	1457.	1416.	1377.	1339.
1302.	1266.	1231.	1197.	1164.	1131.	1100.	1070.	1040.	1011.
983.	956.	929.	904.	879.	854.	831.	808.	785.	763.
742.	722.	702.	682.	663.	645.	627.	610.	593.	576.
561.	545.	530.	515.	501.	487.	474.	460.	448.	435.

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	16.98	14.29	2.69	1494535.
										(431.)	(363.)	(68.)	(42320.48)

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HYDROGRAPH ROUTING

ROUTE TO SUBAREA 3

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	6	1	0	0	0	1	1	0

ALL PLANS HAVE SAME
ROUTING DATA

CLASS	CLASS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0800	0.0350	0.0800	1071.0	1100.0	42400.	0.00900

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
100.00 1100.00 140.00 1080.00 260.00 1075.00 270.00 1071.00 310.00 1071.00
320.00 1075.00 420.00 1080.00 580.00 1100.00

STORAGE	0.00	65.09	141.51	235.62	412.42	688.98	1064.88	1494.47	1946.74
	2919.29	3439.57	3982.52	4548.14	5136.43	5747.39	6381.02	7037.32	7716.30
OUTFLOW	0.00	335.83	1103.33	2319.48	4184.42	6812.71	10389.25	15205.97	20959.05
	35147.43	43553.82	52827.91	62969.75	73982.09	85869.81	98639.25	112297.88	126854.09
STAGE	1071.00	1072.53	1074.05	1075.58	1077.10	1078.63	1080.16	1081.68	1083.21
	1084.26	1087.79	1089.31	1090.84	1092.37	1093.89	1095.42	1096.94	1098.47
FLOW	0.00	335.83	1103.33	2319.48	4184.42	6812.71	10389.25	15205.97	20959.05
	35147.43	43553.82	52827.91	62969.75	73982.09	85869.81	98639.25	112297.88	126854.09

MAXIMUM STAGE IS 1084.5

MAXIMUM STAGE IS 1084.5

MAXIMUM STAGE IS 1084.5

MAXIMUM STAGE IS 1084.5

MAXIMUM STAGE IS 1084.5

MAXIMUM STAGE IS 1084.5

MAXIMUM STAGE IS 1084.5

MAXIMUM STAGE IS 1084.5

MAXIMUM STAGE IS 1084.5

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 7 (CANADA LAKE AREA)

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
7	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	0	41.00	0.00	288.00	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	16.98	70.00	84.00	96.00	101.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.890

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.07	0.00	0.06

UNIT HYDROGRAPH DATA

TC= 10.37 R= 27.39 NTA= 0

RECESSION DATA

STRTQ= 53.00 QRCSN= 420.00 RTIOR= 1.30

UNIT HYDROGRAPH 10 END-OF-PERIOD ORDINATES, LAG= 10.50 HOURS, CP= 0.31 VOL= 0.51

3.	10.	20.	33.	48.	65.	83.	102.	123.	145.
168.	191.	216.	242.	268.	295.	323.	351.	381.	410.
441.	471.	500.	529.	556.	582.	606.	630.	652.	673.
693.	711.	728.	744.	758.	771.	781.	791.	798.	802.
804.	801.	795.	788.	780.	773.	766.	759.	752.	746.
739.	732.	726.	719.	712.	706.	699.	693.	687.	681.
674.	668.	662.	656.	650.	644.	638.	633.	627.	621.
616.	610.	604.	599.	594.	588.	583.	577.	572.	567.
562.	557.	552.	547.	542.	537.	532.	527.	522.	518.
513.	508.	504.	499.	494.	490.	486.	481.	477.	472.

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	16.98	14.44	2.54	790025.
										(431.)	(367.)	(65.)	(22371.00)

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HYDROGRAPH ROUTING

ROUTE THROUGH CANADA LAKE - STEWART'S LANDING DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
700	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.00	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1542.	-1

STAGE	1542.40	1543.40	1544.40	1545.40	1546.40	1547.40	1548.40	1549.40	1550.40
	1554.40	1556.40	1558.40	1560.40					
FLOW	0.00	403.00	1140.00	2100.00	3245.00	4555.00	6075.00	7880.00	9975.00
	20225.00	26275.00	32100.00	38300.00					
CAPACITY=	0.	925.	4030.	10215.	12260.	14730.	20225.	26760.	34385.
ELEVATION=	1508.	1520.	1530.	1540.	1542.	1545.	1550.	1555.	1560.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1542.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1550.4	2.6	1.5	360.

PEAK OUTFLOW IS 3251. AT TIME 61.00 HOURS

PEAK OUTFLOW IS 3251. AT TIME 61.00 HOURS

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PEAK OUTFLOW IS 3251. AT TIME 61.00 HOURS

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HYDROGRAPH ROUTING

ROUTE TO SUBAREA 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0800	0.0350	0.0800	1142.0	1180.0	70400.	0.0120

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
100.00 1145.00 180.00 1160.00 220.00 1145.00 227.50 1142.00 252.50 1142.00
260.00 1145.00 340.00 1160.00 390.00 1180.00

STORAGE	0.00	96.97	228.69	409.70	642.42	926.87	1263.03	1651.91	2090.50
	3125.09	3700.21	4322.42	4986.67	5692.93	6441.21	7231.51	8063.84	8938.18
OUTFLOW	0.00	395.01	1438.08	3171.57	5554.40	8615.70	12389.21	16910.60	22216.31
	35443.23	43417.09	52280.16	62051.77	72752.77	84405.14	97031.56	110655.03	125298.83
STAGE	1142.00	1144.00	1146.00	1148.00	1150.00	1152.00	1154.00	1156.00	1158.00
	1162.00	1164.00	1166.00	1168.00	1170.00	1172.00	1174.00	1176.00	1178.00
FLOW	0.00	395.01	1438.08	3171.57	5554.40	8615.70	12389.21	16910.60	22216.31
	35443.23	43417.09	52280.16	62051.77	72752.77	84405.14	97031.56	110655.03	125298.83

MAXIMUM STAGE IS 1148.1

MAXIMUM STAGE IS 1148.1

MAXIMUM STAGE IS 1148.1

MAXIMUM STAGE IS 1148.1

MAXIMUM STAGE IS 1148.1

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MAXIMUM STAGE IS 1148.1

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA ?

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
800	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	0	19.00	0.00	288.00	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
2.0?	18.9?	72.00	84.00	96.00	101.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .89?

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.07	0.00	0.01

UNIT HYDROGRAPH DATA

TC= 9.94 R= 0.67 NTA= 0

RECESSION DATA

STRTQ= 21.00 QRCSN= 200.00 RTIOR= 1.39

UNIT HYDROGRAPH 100 END-OF-PERIOD ORDINATES, LAG= 9.11 HOURS, CP= 0.64 VOL= 0.91

4.	16.	33.	54.	78.	103.	131.	161.	192.	224.
257.	291.	326.	362.	398.	435.	472.	510.	548.	586.
624.	660.	693.	724.	752.	778.	801.	822.	840.	856.
869.	880.	888.	894.	897.	897.	895.	888.	878.	861.
837.	812.	787.	763.	740.	717.	695.	674.	653.	633.
614.	595.	577.	560.	543.	526.	510.	494.	479.	465.
451.	437.	423.	411.	398.	386.	374.	363.	352.	341.
331.	320.	311.	301.	292.	283.	274.	266.	258.	250.
242.	235.	228.	221.	214.	208.	201.	195.	189.	183.
174.	172.	167.	162.	157.	152.	148.	143.	139.	135.

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q

SUM 16.98 14.29 2.69 645.41.
(431.)(363.)(68.)(18288.82)

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HYDROGRAPH ROUTING

ROUTE TO SUBAREA 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
308	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.00	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

GN(1)	GN(2)	GN(3)	ELNVT	ELMAX	RLNTH	SEL
.0800	0.0350	0.0800	911.0	940.0	24000.	0.0080

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

1 0.00 940.00 220.00 920.00 280.00 915.00 290.00 911.00 350.00 911.00
300.00 915.00 440.00 920.00 540.00 940.00

STORAGE	0.00	53.64	113.74	182.36	261.23	416.03	586.66	788.17	987.81
	1445.42	1695.41	1959.51	2237.73	2530.07	2836.53	3157.11	3491.79	3840.60
OUTFLOW	0.00	470.23	1524.49	3135.06	5426.03	8403.28	12156.57	16820.64	22254.00
	35470.19	43116.68	51604.11	60871.69	70929.91	81790.38	93465.25	105967.11	119309.14
STAGE	911.00	912.56	914.05	915.50	917.10	918.63	920.14	921.66	923.21
	926.26	927.79	929.31	930.84	932.37	933.89	935.42	936.95	938.47
FLOW	0.00	470.23	1524.49	3135.06	5426.03	8403.28	12156.57	16820.64	22254.00
	35470.19	43116.68	51604.11	60871.69	70929.91	81790.38	93465.25	105967.11	119309.14

MAXIMUM STAGE IS 917.1

MAXIMUM STAGE IS 917.1

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MAXIMUM STAGE IS 917.1

MAXIMUM STAGE IS 917.1

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COMBINE HYDROGRAPHS

COMBINE 5 HYDROGRAPHS AT DOLGEVILLE 2+3+6+7+8=3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	5	0	0	1	0	1	0	0

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HYDROGRAPH ROUTING

ROUTE OVER DOLGEVILLE DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-734.	-1

STAGE	734.00	734.80	735.20	735.60	736.40	737.20	738.40	739.90	742.90
	748.9	751.90	754.90	757.90	760.90	763.90	766.90	772.90	775.90
FLOW	0.00	521.0	882.00	1377.00	2235.00	3258.00	5306.0	9176.00	15713.00
	32304.0	42464.00	53511.00	65378.00	78012.00	91368.00	105656.00	120140.00	135352.00
CAPACITY=	1.	30.	68.	113.	166.	229.	302.	401.	565.	710.
	1173.	1173.	1366.	1616.	2175.	2356.	2951.	3246.	3647.	4027.

ELEVATION										
	754.	758.	758.	764.	764.	764.	768.	772.	772.	774.
	758.	760.	762.	766.	768.	770.	774.	778.	778.	781.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
734.0	[illegible]	[illegible]	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
740.0	2.6	1.5	50.

PEAK OUTFLOW IS 54286. AT TIME 50.50 HOURS

PEAK OUTFLOW IS 54286. AT TIME 50.50 HOURS

PEAK OUTFLOW IS 54286. AT TIME 50.50 HOURS

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PEAK OUTFLOW IS 54286. AT TIME 50.50 HOURS

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 4

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
410	0	0	0	0	0	1	0	1

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	15.40	0.00	288.00	0.00	0.000	0	1	

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	18.90	70.00	84.00	96.00	101.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 1.89

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
1	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.07	0.00	0.00

...IT HYDROGRAPH DATA
TC= 9.76 R= 11.32 NTA= 0

RECESSION DATA
STRTG= 13.00 QRCSN= 159.00 RTIOR= 1.30

UNIT HYDROGRAPH 100 END-OF-PERIOD ORDINATES, LAG= 9.37 HOURS, CP= 0.54 VOL= 1.00

5.	10.	20.	33.	47.	65.	80.	98.	117.	137.
159.	180.	202.	225.	248.	272.	296.	321.	346.	371.
396.	419.	441.	462.	481.	499.	515.	530.	543.	555.
566.	575.	582.	588.	592.	595.	595.	592.	587.	577.
564.	552.	540.	528.	516.	505.	494.	483.	473.	462.
452.	442.	433.	423.	414.	405.	396.	387.	379.	371.
363.	355.	347.	339.	332.	325.	318.	311.	304.	297.
291.	284.	278.	272.	266.	260.	255.	249.	244.	238.
233.	228.	223.	218.	213.	209.	204.	200.	195.	191.
187.	183.	179.	175.	171.	167.	164.	160.	157.	153.

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	END-OF-PERIOD FLOW MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	16.98	14.32	2.66	472860.
										(431.)	(364.)	(68.)	(13389.89)

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COMBINE HYDROGRAPHS

COMBINE 2 HYDROGRAPHS 3+4=4

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	0	2	0	0	0	1	0	0

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HYDROGRAPH ROUTING

ROUTE THRU KYSER LAKE AND OVER INGHAMS DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	3	1	0	0	0	1	0	0

ALL PLANS HAVE SAME
ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-666.	-1

STAGE	657.3	659.0	661.0	663.7	667.0	672.0	675.0	677.5	679.2
	667.	669.0	670.0	672.0	673.0	675.0	677.0	679.0	680.0
FLOW	.0	1500.	3000.	5500.	7000.	9250.	11500.	13750.	15000.
	2500.	3750.	5000.	6250.	7500.	8750.	10000.	11250.	12500.
CAPACITY=	0.	350.	826.	1330.	1910.	2500.	3150.	3800.	4150.	4600.
	5000.	5500.	5950.	6400.	6900.	7300.	7820.	8170.	11500.	12000.
ELEVATION=	634.	636.	642.	646.	650.	654.	657.	660.	664.	666.
	668.	670.	672.	674.	676.	678.	680.	685.	690.	695.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
657.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
665.8	2.6	1.5	480.

PEAK OUTFLOW IS 57400. AT TIME 50.50 HOURS

PEAK OUTFLOW IS 57400. AT TIME 50.50 HOURS

PEAK OUTFLOW IS 57400. AT TIME 50.50 HOURS

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PEAK OUTFLOW IS 57400. AT TIME 50.50 HOURS

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HYDROGRAPH ROUTING

ROUTE TO SUBAREA 5

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
54	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	ITMP	LSTR

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISTAT
1	3	0	0.00	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELINV	ELMAX	RLNTH	SEL
0.0800	0.0350	0.0800	509.0	540.0	8400.	0.01000

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

100.00 540.00 300.00 520.00 380.00 515.00 395.00 509.00 545.00 509.00
560.00 515.00 800.00 520.00 116.00 540.00

STORAGE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OUTFLOW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STAGE	509.00	511.63	512.26	513.89	515.53	517.16	518.79	521.42	522.05
	525.31	524.95	528.58	531.21	533.84	533.47	535.10	536.74	538.37
FLOW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MAXIMUM STAGE IS 5 01.3

MAXIMUM STAGE IS 5001.3

MAXIMUM STAGE IS 5001.3

MAXIMUM STAGE IS 5001.3

MAXIMUM STAGE IS 5001.3

MAXIMUM STAGE IS 5001.3

MAXIMUM STAGE IS 5001.3

MAXIMUM STAGE IS 5 01.3

MAXIMUM STAGE IS 5 01.3

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SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 5

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
5	1	2	3		3	1		1

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1		12.20	0.00	268.00	0.00	0.000	0	1	2

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	14.90	70.00	84.00	96.00	101.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.690

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.07	0.00	0.02

UNIT HYDROGRAPH DATA

TC= 9.12 R= 12.27 NTA= 0

RECESSION DATA

STRTQ= 5.00 QRCSN= 120.00 RTIOR= 1.30

UNIT HYDROGRAPH 100 END-OF-PERIOD ORDINATES, LAG= 8.87 HOURS, CP= 0.49 VOL= 0.81

2.	8.	16.	26.	38.	51.	65.	80.	95.	112.
129.	146.	165.	183.	203.	222.	242.	262.	283.	303.
321.	339.	355.	371.	385.	398.	409.	420.	429.	437.
444.	449.	453.	455.	456.	454.	448.	440.	431.	423.
414.	406.	397.	389.	382.	374.	366.	359.	352.	345.
336.	331.	324.	318.	311.	305.	299.	293.	287.	281.
275.	270.	264.	259.	254.	249.	244.	239.	234.	229.
225.	220.	216.	211.	207.	203.	199.	195.	191.	187.
183.	180.	176.	172.	169.	165.	162.	159.	156.	153.
149.	146.	143.	141.	138.	135.	132.	130.	127.	124.

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	16.98	14.33	2.65	366140.
										(431.)	(364.)	(67.)	(10365.09)

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COMBINE HYDROGRAPHS

COMBINE 2 HYDROGRAPHS 4+5=5 TOTAL INFLOW TO EAST CANADA LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
500	2	0				1		

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HYDROGRAPH ROUTING

ROUTE THROUGH RESERVOIR AND OVER BEARDSLEE FALLS DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
500	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-499.	-1

STAGE	498.50	499.00	500.00	501.00	502.00	504.00	505.00	506.50	508.00
	512.00	514.00	516.00						
FLOW	0.00	1525.00	2935.00	14315.00	26490.00	36560.00	41830.00	46790.00	57115.00
	64275.00	99830.00	116510.00						

CAPACITY=	0.	5.	34.	103.	223.	395.	619.	976.	1262.	1794.
	2280.	2487.	3046.	4004.	5485.	5866.	6438.	7946.	9756.	
ELEVATION=	443.	445.	450.	455.	460.	465.	470.	475.	480.	485.
	490.	492.	495.	500.	507.	508.	510.	515.	520.	

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
498.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
508.0	2.6	1.5	900.

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
50.	3.50	443.00	0.50	491.50	508.00

BEGIN DAM FAILURE AT 52.00 HOURS

PEAK OUTFLOW IS 134702. AT TIME 52.50 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
50.	3.50	443.00	2.00	491.50	508.00

BEGIN DAM FAILURE AT 52.[illegible] HOURS

PEAK OUTFLOW IS 87[illegible]. AT TIME 54.00 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
50.	0.50	443.[illegible]	[illegible]	491.50	508.08

BEGIN DAM FAILURE AT 52.[illegible] HOURS

PEAK OUTFLOW IS 69203. AT TIME 56.92 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
130.	0.50	443.00	0.50	491.50	508.08

BEGIN DAM FAILURE AT 52.[illegible] HOURS

PEAK OUTFLOW IS 184515. AT TIME 52.50 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
130.	0.50	443.00	2.00	491.50	508.08

BEGIN DAM FAILURE AT 52.00 HOURS

PEAK OUTFLOW IS 107147. AT TIME 53.75 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
130.	0.50	443.00	5.00	491.50	508.08

BEGIN DAM FAILURE AT 52.00 HOURS

PEAK OUTFLOW IS 75243. AT TIME 55.58 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
240.	0.50	443.00	0.50	491.50	508.08

BEGIN DAM FAILURE AT 52.00 HOURS

PEAK OUTFLOW IS 241682. AT TIME 52.47 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
260.	0.50	443.00	2.00	491.50	508.08

BEGIN DAM FAILURE AT 52.[illegible] HOURS

PEAK OUTFLOW IS [illegible] AT TIME [illegible] HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
260.	0.50	443.00	5.00	491.50	508.08

BEGIN DAM FAILURE AT 52.00 HOURS

PEAK OUTFLOW IS 79363. AT TIME 54.67 HOURS

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

CHANNEL ROUTE TO USGS GAGE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3600	1	0	0	0	0	1	[illegible]	[illegible]

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0700	0.0350	0.0700	331.0	360.0	3100.	0.04700

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

100.00 360.00 140.00 340.00 180.00 335.00 [illegible] 331.00 290.00 331.00
300.00 335.00 360.00 340.00 400.00 360.00

STORAGE	0.00	11.28	23.36	36.50	52.45	71.71	94.28	118.58	143.54
	195.45	222.40	250.01	278.28	307.22	336.82	367.09	398.02	429.61
OUTFLOW	.00	1885.74	6655.08	12230.85	20605.64	31356.79	43716.41	58855.50	76139.72
	116166.31	139031.13	163669.22	190070.94	218213.44	248078.66	279652.25	312922.69	347882.25
STAGE	331.00	332.53	334.05	335.58	337.11	338.63	340.16	341.68	343.21
	344.26	347.79	349.32	350.84	352.37	353.89	355.42	356.95	358.47
FLOW	.00	1885.74	6655.08	12230.85	20605.64	31356.79	43716.41	58855.50	76139.72
	116166.31	139031.13	163669.22	190070.94	218213.44	248078.66	279652.25	312922.69	347882.25

MAXIMUM STAGE IS 347.3

MAXIMUM STAGE IS 344.0

MAXIMUM STAGE IS 342.6

MAXIMUM STAGE IS 350.5

MAXIMUM STAGE IS 345.7

MAXIMUM STAGE IS 343.1

MAXIMUM STAGE IS 353.7

MAXIMUM STAGE IS 345.8

MAXIMUM STAGE IS 343.5

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

CHANNEL ROUTE TO DOWNSTREAM HAZARD

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
69[illegible]0	1	0	0	0	2	1	[illegible]	[illegible]

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
1.0	0.000	0.00	1	1	0	0	5

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.00	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
[illegible]0730	0.0355	[illegible].07[illegible]	316.0	360.0	3300.	0.0045

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

100.00 360.00 160.0 340.00 540.00 320.00 650.00 316.00 810.00 316.00

820.00 320.00 900.0 340.00 960.00 360.00

ST HWAY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	851.64	964.60	1107.59	1289.33	1360.91	1525.34	1672.61	1822.73
OUTFLOW	.00	1869.25	6063.64	12470.65	21105.81	32108.29	45619.95	61783.88	80742.86
	127609.36	157125.75	190548.03	227006.34	266430.50	308765.75	353968.88	402035.31	452847.69
STAGE	316.01	319.32	320.63	322.95	325.26	327.58	329.89	332.21	334.53
	339.14	341.47	343.79	346.11	348.42	350.74	353.05	355.37	357.68
FLOW	0.00	1869.25	6063.64	12470.65	21105.81	32108.29	45619.95	61783.88	80742.86
	127609.36	157125.75	190548.03	227006.34	266430.50	308765.75	353968.88	402035.31	452847.69

STATION 6900, PLAN 1, RTIO 1

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	36.	175.
382.	552.	653.	706.	724.	719.	698.	669.	634.	597.
559.	522.	486.	452.	420.	390.	363.	338.	314.	293.
273.	255.	239.	224.	210.	198.	186.	175.	166.	157.
149.	141.	134.	128.	122.	117.	112.	107.	103.	99.
95.	91.	88.	85.	82.	80.	77.	75.	73.	71.
69.	67.	65.	64.	62.	61.	59.	58.	57.	56.
55.	54.	53.	52.	52.	51.	50.	50.	49.	49.
48.	48.	47.	47.	47.	46.	46.	46.	45.	45.
45.	45.	45.	44.	44.	44.	44.	45.	45.	45.
46.	47.	48.	49.	51.	53.	56.	59.	62.	67.
72.	77.	84.	92.	101.	111.	122.	135.	150.	167.
186.	207.	232.	259.	289.	323.	361.	404.	451.	502.
559.	621.	688.	762.	841.	927.	1021.	1126.	1244.	1377.
1535.	1610.	1717.	1854.	2091.	2285.	2505.	2754.	3443.	4541.
5346.	5952.	6655.	7331.	8071.	8864.	9710.	10604.	11533.	12494.
13504.	14575.	15748.	16941.	18192.	19572.	21069.	22681.	24323.	26010.
27713.	28908.	29690.	30810.	32124.	33543.	35033.	36624.	38420.	41225.
41644.	43300.	44694.	46054.	47371.	48626.	49858.	51029.	52096.	53074.
53964.	54762.	55471.	56088.	56614.	57052.	57423.	57708.	74821.	119509.
112631.	77784.	77474.	70267.	64956.	62360.	59134.	58147.	56212.	55434.
53921.	53176.	52083.	51342.	50384.	49592.	48670.	47830.	46917.	46047.
45144.	44176.	43146.	42206.	41283.	40386.	39501.	38629.	37768.	36918.
36080.	35255.	34364.	33447.	32619.	31829.	31061.	30309.	29566.	28834.
28107.	27388.	26676.	25920.	25129.	24396.	23701.	23012.	22303.	21562.
20824.	20087.	19307.	18424.	17432.	16450.	15516.	14602.	13722.	12885.
12047.	11191.	10432.	9793.	9213.	8676.	8183.	7728.	7309.	6867.
6417.	6059.	5744.	5512.	5259.	5027.	4811.	4614.	4431.	4264.
4119.	3966.	3834.	3712.	3601.	3500.	3407.	3320.	3240.	3165.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	1.	3.
8.	9.	10.	11.	11.	11.	11.	10.	10.	9.
9.	8.	8.	7.	7.	6.	6.	5.	5.	5.

```
    4.       4.       4.       3.       3.       3.       3.       3.       3.       2.
    2.       2.       2.       2.       2.       2.       2.       2.       2.       2.
    1.       1.       1.       1.       1.       1.       1.       1.       1.       1.
    1.       1.       1.       1.       1.       1.       1.       1.       1.       1.
    1.       1.       1.       1.       1.       1.       1.       1.       1.       1.
    1.       1.       1.       1.       1.       1.       1.       1.       1.       1.
    1.       1.       1.       1.       1.       1.       1.       1.       1.       1.
    1.       1.       1.       1.       1.       1.       1.       1.       1.       1.
    1.       1.       1.       1.       2.       2.       2.       2.       2.       3.
    3.       3.       4.       4.       5.       5.       6.       6.       7.       8.
    9.      10.      11.      12.      13.      14.      16.      18.      19.      21.
   23.      25.      27.      29.      31.      32.      34.      36.      41.      49.
   55.      60.      64.      69.      73.      78.      84.      89.      95.     101.
  107.     114.     121.     128.     135.     143.     152.     162.     171.     181.
  191.     197.     202.     208.     216.     224.     232.     241.     251.     261.
  269.     277.     285.     293.     300.     306.     313.     319.     325.     330.
  335.     339.     343.     346.     349.     351.     353.     354.     443.     663.
  630.     458.     457.     420.     392.     379.     362.     357.     347.     342.
  334.     330.     325.     321.     316.     311.     306.     302.     297.     293.
  288.     282.     277.     271.     266.     261.     257.     252.     247.     242.
  238.     233.     228.     223.     219.     214.     210.     205.     201.     197.
  193.     189.     185.     180.     176.     172.     168.     164.     160.     155.
  151.     147.     142.     137.     131.     125.     119.     114.     108.     103.
   96.      93.      88.      84.      80.      77.      74.      71.      68.      66.
   65.      61.      56.      56.      55.      53.      51.      50.      48.      47.
   46.      45.      44.      43.      42.      41.      41.      40.      39.      39.

                                     STAGE
 316.0    316.0    316.0    316.0    316.0    316.0    316.0    316.0    316.0    316.0
 316.0    316.0    316.0    316.0    316.0    316.0    316.0    316.0    316.0    316.2
 316.5    316.7    316.8    316.9    316.9    316.9    316.9    316.8    316.8    316.7
 316.7    316.6    316.6    316.6    316.5    316.5    316.4    316.4    316.4    316.4
 316.3    316.3    316.3    316.3    316.3    316.2    316.2    316.2    316.2    316.2
 316.2    316.2    316.2    316.2    316.2    316.1    316.1    316.1    316.1    316.1
 316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1
 316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1
 316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1
 316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1
 316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1
 316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1
 316.1    316.1    316.1    316.1    316.1    316.1    316.2    316.2    316.2    316.2
 316.2    316.3    316.3    316.3    316.4    316.4    316.4    316.5    316.6    316.6
 316.7    316.8    316.9    316.9    317.0    317.1    317.3    317.4    317.5    317.7
 317.9    318.0    318.1    318.3    318.4    318.5    318.7    318.8    319.2    319.8
 320.2    320.6    320.8    321.1    321.4    321.6    321.9    322.3    322.6    323.0
 323.2    323.5    323.8    324.1    324.5    324.9    325.3    325.6    325.9    326.3
 326.7    326.9    327.1    327.3    327.6    327.8    328.1    328.4    328.7    329.0
 329.2    329.5    329.7    330.0    330.1    330.3    330.5    330.7    330.9    331.7
 331.1    331.2    331.3    331.4    331.5    331.5    331.6    331.6    333.8    338.4
 337.6    334.2    334.1    333.2    332.6    332.3    331.8    331.7    331.4    331.3
 331.1    331.2    330.8    330.7    330.6    330.5    330.3    330.2    331.1    330.0
```

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
328.7	328.6	328.4	328.3	328.1	328.0	327.8	327.7	327.5	327.4
325.2	325.0	324.8	324.5	324.3	324.0	323.8	323.5	323.3	323.1
322.6	322.5	322.2	322.	321.8	321.6	321.4	321.2	321.1	320.9
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
319.6	319.5	319.4	319.3	319.3	319.2	319.2	319.1	319.1	319.0

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	119509.	64586.	41[illegible]7.	14969.	431[illegible]976.
CMS	3384.	1829.	1161.	424.	122073.
INCHES		2.09	5.30	5.80	5.80
MM		52.99	134.57	147.37	147.37
AC-FT		32526.	81336.	89070.	89079.
THOUS CU M		39504.	100326.	109866.	109866.

MAXIMUM STORAGE = 663.

MAXIMUM STAGE IS 330.4

STATION 6900, PLAN 2, RTIO 1

OUTFLOW

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	175.
542.	552.	655.	706.	724.	719.	698.	669.	634.	597.
559.	522.	486.	452.	420.	393.	363.	338.	314.	293.
273.	255.	239.	224.	210.	198.	186.	175.	166.	157.
149.	141.	134.	128.	122.	117.	112.	107.	103.	99.
95.	91.	88.	85.	82.	80.	77.	75.	73.	71.
69.	67.	65.	64.	62.	61.	59.	58.	57.	56.
55.	54.	53.	52.	52.	51.	50.	50.	49.	49.
46.	46.	47.	47.	47.	46.	46.	46.	45.	45.
45.	45.	45.	44.	44.	44.	44.	45.	45.	45.
46.	47.	48.	49.	51.	53.	56.	59.	62.	67.
72.	77.	84.	92.	101.	111.	122.	135.	150.	167.
186.	207.	232.	259.	289.	323.	361.	404.	451.	502.
559.	621.	688.	762.	841.	927.	1021.	1126.	1244.	1377.
1526.	1696.	1717.	1854.	2091.	2285.	2505.	2754.	3443.	4541.
5346.	5952.	6655.	7331.	8071.	8864.	9710.	10604.	11533.	12494.
13504.	14575.	15746.	16941.	18192.	19572.	21069.	22681.	24323.	26010.
27713.	28908.	29697.	30810.	32124.	33543.	35033.	36624.	38422.	40225.
41844.	43309.	44694.	46054.	47371.	48626.	49858.	51029.	52196.	53074.
53964.	54762.	55471.	56088.	56614.	57052.	57423.	57706.	59642.	64085.
68906.	73383.	77322.	78555.	76217.	82010.	83666.	72713.	66956.	62172.
58455.	56339.	53969.	52445.	50964.	49981.	48867.	47969.	46922.	46099.
45167.	44198.	43154.	42214.	41285.	40389.	39501.	38630.	37768.	36919.
36076.	35255.	34364.	33447.	32619.	31829.	31061.	30309.	29564.	28834.
28117.	27386.	26671.	25920.	25169.	24396.	23701.	23012.	22315.	21562.
20964.	20187.	19527.	18424.	17432.	16450.	15516.	14652.	13766.	12885.

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    6417.     6759.     5794.     5512.     5259.     5027.     4811.     4614.     4431.     4264.
    4109.     3960.     3834.     3712.     3601.     3500.     3407.     3320.     3240.     3165.

                                            STOR
       0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
       0.        0.        0.        0.        0.        0.        0.        0.        1.        3.
       8.        9.       10.       11.       11.       11.       11.       10.       10.        9.
       9.        8.        8.        7.        7.        6.        6.        5.        5.        5.
       4.        4.        4.        3.        3.        3.        3.        3.        3.        2.
       2.        2.        2.        2.        2.        2.        2.        2.        2.        2.
       1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
       1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
       1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
       1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
       1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
       1.        1.        1.        1.        2.        2.        2.        2.        2.        3.
       3.        3.        4.        4.        5.        5.        6.        6.        7.        8.
       9.       10.       11.       12.       13.       14.       16.       18.       19.       21.
      23.       25.       27.       29.       31.       32.       34.       36.       41.       49.
      55.       60.       64.       69.       73.       78.       84.       89.       95.      101.
     107.      114.      121.      128.      135.      143.      152.      162.      171.      181.
     191.      197.      202.      208.      216.      224.      232.      241.      251.      261.
     269.      277.      285.      293.      300.      306.      313.      319.      325.      330.
     335.      339.      343.      346.      349.      351.      353.      354.      365.      368.
     413.      436.      456.      462.      450.      480.      488.      432.      403.      378.
     358.      347.      335.      327.      319.      313.      308.      303.      298.      293.
     283.      282.      277.      271.      266.      261.      257.      252.      247.      242.
     258.      233.      228.      223.      219.      214.      210.      205.      201.      197.
     193.      189.      185.      180.      176.      172.      168.      164.      160.      155.
     151.      147.      142.      137.      131.      125.      119.      114.      108.      103.
      98.       93.       88.       84.       80.       77.       74.       71.       68.       66.
      63.       61.       58.       56.       55.       53.       51.       50.       48.       47.
      46.       45.       44.       43.       42.       41.       41.       40.       39.       39.

                                            STAGE
   316.0     316.0     316.0     316.0     316.0     316.0     316.0     316.0     316.0     316.0
   316.0     316.0     316.0     316.0     316.0     316.0     316.0     316.0     316.0     316.2
   316.5     316.7     316.8     316.9     316.9     316.9     316.9     316.8     316.8     316.7
   316.7     316.6     316.6     316.6     316.5     316.5     316.4     316.4     316.4     316.4
   316.3     316.3     316.3     316.3     316.3     316.2     316.2     316.2     316.2     316.2
   316.2     316.2     316.2     316.2     316.2     316.1     316.1     316.1     316.1     316.1
   316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
   316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
   316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
   316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
   316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
   316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
   316.1     316.1     316.1     316.1     316.1     316.1     316.2     316.2     316.2     316.2
   316.2     316.3     316.3     316.3     316.4     316.4     316.4     316.5     316.6     316.6
```

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	316.1	[illegible]	[illegible]	316.5	316.7	316.8	319.2	319.8
[illegible]	[illegible]	320.8	321.1	321.4	321.6	321.9	322.3	322.6	323.0
323.2	323.5	323.8	324.1	324.5	324.9	325.3	325.6	325.9	326.3
326.7	326.9	327.1	327.3	327.6	327.8	328.1	328.4	328.7	329.0
329.2	329.5	329.7	330.0	330.1	330.3	330.5	330.7	330.8	331.0
331.1	331.2	331.3	331.4	331.5	331.5	331.6	331.6	331.9	332.5
333.1	333.6	334.1	334.5	334.0	334.7	334.8	333.5	332.8	332.3
331.7	331.4	331.1	330.9	330.7	330.5	330.4	330.2	330.1	330.0
329.8	329.7	329.5	329.3	329.2	329.0	328.8	328.7	328.5	328.4
328.3	328.1	328.0	327.8	327.7	327.5	327.4	327.2	327.0	326.9
326.7	326.6	326.4	326.3	326.1	326.0	325.8	325.7	325.5	325.4
325.2	325.0	324.8	324.5	324.3	324.0	323.8	323.5	323.3	323.1
322.8	322.5	322.2	322.0	321.8	321.6	321.4	321.2	321.1	320.9
320.8	320.6	320.5	320.3	320.2	320.1	319.9	319.8	319.7	319.6
319.6	319.5	319.4	319.3	319.3	319.2	319.2	319.1	319.1	319.0

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	83666.	64011.	40594.	14931.	4300103.
CMS	2369.	1813.	1158.	423.	121765.
INCHES		2.07	5.28	5.79	5.79
MM		52.52	134.20	146.99	146.99
AC-FT		31741.	81111.	88845.	88845.
THOUS CU M		39152.	100049.	109589.	109589.

MAXIMUM STORAGE = 485.

MAXIMUM STAGE IS 334.8

STATION 6900, PLAN 3, RTIO 1

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	36.	175.
362.	552.	653.	706.	724.	719.	698.	669.	634.	597.
559.	522.	486.	452.	420.	390.	363.	338.	314.	293.
273.	255.	239.	224.	210.	198.	186.	175.	166.	157.
149.	141.	134.	128.	122.	117.	112.	107.	103.	99.
95.	91.	88.	85.	82.	80.	77.	75.	73.	71.
69.	67.	65.	64.	62.	61.	59.	58.	57.	56.
55.	54.	53.	52.	52.	51.	50.	50.	49.	49.
48.	48.	47.	47.	47.	46.	46.	46.	45.	45.
45.	45.	45.	44.	44.	44.	44.	45.	45.	45.
46.	47.	48.	49.	51.	53.	56.	59.	62.	67.
72.	77.	84.	92.	101.	111.	122.	135.	150.	167.
186.	207.	232.	259.	289.	323.	361.	404.	451.	502.
559.	621.	688.	762.	841.	927.	1021.	1126.	1244.	1377.
1525.	1690.	1717.	1854.	2091.	2285.	2505.	2754.	3443.	4541.
5340.	5952.	6655.	7331.	8071.	8864.	9710.	10604.	11533.	12494.
13504.	14575.	15748.	16941.	18192.	19572.	21069.	22681.	24323.	26010.

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
41644.	43395.	44694.	46154.	47371.	48626.	49858.	51029.	52196.	53074.
53964.	54762.	55471.	56088.	56614.	57052.	57423.	57708.	58307.	59372.
60443.	61398.	62150.	62714.	63171.	63504.	63522.	63455.	63757.	63001.
59466.	56699.	56765.	56634.	62328.	65513.	68142.	69046.	[illegible]	56235.
51481.	47930.	45464.	43699.	41974.	41027.	39698.	38767.	37863.	36964.
36096.	35271.	34369.	33454.	32620.	31831.	31061.	30309.	29566.	28834.
28107.	27388.	26676.	25920.	25129.	24396.	23701.	23012.	22303.	21562.
20824.	20087.	19307.	18424.	17432.	16450.	15516.	14602.	13722.	12885.
12047.	11191.	10432.	9793.	9210.	8676.	8163.	7728.	7309.	6867.
6417.	6059.	5790.	5512.	5259.	5027.	4811.	4614.	4431.	4264.
4109.	3966.	3834.	3712.	3601.	3500.	3407.	3320.	3245.	3165.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	1.	3.
6.	9.	10.	11.	11.	11.	11.	10.	10.	9.
9.	8.	8.	7.	7.	6.	6.	5.	5.	5.
4.	4.	4.	3.	3.	3.	3.	3.	3.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	2.	2.	2.	2.	2.	3.
3.	3.	4.	4.	5.	5.	6.	6.	7.	8.
9.	10.	11.	12.	13.	14.	16.	18.	19.	21.
23.	25.	27.	29.	31.	32.	34.	36.	41.	49.
55.	60.	64.	69.	73.	78.	84.	89.	95.	101.
107.	114.	121.	128.	135.	143.	152.	162.	171.	181.
191.	197.	202.	208.	216.	224.	232.	241.	251.	261.
269.	277.	285.	293.	300.	306.	313.	319.	325.	330.
335.	339.	343.	346.	349.	351.	353.	354.	358.	363.
369.	374.	378.	381.	383.	385.	385.	385.	386.	382.
364.	350.	350.	359.	379.	395.	409.	413.	388.	347.
321.	303.	289.	280.	270.	264.	258.	252.	247.	243.
238.	233.	228.	223.	219.	214.	210.	205.	201.	197.
193.	189.	185.	180.	176.	172.	168.	164.	160.	155.
151.	147.	142.	137.	131.	125.	119.	114.	108.	103.
98.	93.	88.	84.	80.	77.	74.	71.	68.	66.
63.	61.	58.	56.	55.	53.	51.	50.	48.	47.
46.	45.	44.	43.	42.	41.	41.	40.	39.	39.

STAGE

316.0	316.0	316.0	316.0	316.0	316.0	316.0	316.0	316.0	316.1
316.0	316.0	316.0	316.0	316.0	316.0	316.0	316.0	316.0	316.2
316.5	316.7	316.8	316.9	316.9	316.9	316.9	316.8	316.6	316.4
316.7	316.6	316.6	316.4	316.5	316.5	316.4	316.4	316.4	316.4
316.3	316.3	316.3	316.3	316.3	316.2	316.2	316.2	316.2	316.2

```
    316.2     316.2     316.2     316.2     316.2     316.1     316.1     316.1     316.1     316.1
    316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
    316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
    316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
    316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
    316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
    316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
    316.1     316.1     316.1     316.1     316.1     316.1     316.2     316.2     316.2     316.2
    316.2     316.3     316.3     316.3     316.4     316.4     316.4     316.5     316.6     316.6
    316.7     316.8     316.9     316.9     317.0     317.1     317.3     317.4     317.5     317.7
    317.9     318.0     318.1     318.3     318.4     318.5     318.7     318.8     319.2     319.8
    320.2     320.6     320.8     321.1     321.4     321.6     321.9     322.3     322.6     323.0
    323.2     323.5     323.8     324.1     324.5     324.9     325.3     325.6     325.9     326.3
    326.7     326.9     327.1     327.3     327.6     327.8     328.1     328.4     328.7     329.0
    329.2     329.5     329.7     330.0     330.1     330.3     330.5     330.7     330.8     331.0
    331.1     331.2     331.3     331.4     331.5     331.5     331.6     331.6     331.7     331.9
    332.0     332.2     332.3     332.3     332.4     332.4     332.4     332.4     332.5     332.4
    331.9     331.5     331.5     331.8     332.3     332.7     333.0     333.1     332.5     331.4
    330.7     330.2     329.9     329.6     329.3     329.1     328.9     328.7     328.6     328.4
    328.3     328.1     328.0     327.8     327.7     327.5     327.4     327.2     327.0     326.9
    326.7     326.6     326.4     326.3     326.1     326.0     325.8     325.7     325.5     325.4
    325.2     325.0     324.8     324.5     324.3     324.0     323.8     323.5     323.3     323.1
    322.8     322.5     322.2     322.0     321.8     321.6     321.4     321.2     321.1     320.9
    320.8     320.6     320.5     320.3     320.2     320.1     319.9     319.8     319.7     319.6
    319.6     319.5     319.4     319.3     319.3     319.2     319.2     319.1     319.1     319.0

                           PEAK    6-HOUR    24-HOUR    72-HOUR   TOTAL VOLUME
                 CFS     59048.    61559.     40589.     14929.       4299674.
                 CMS      1955.     1743.      1158.       423.        121753.
              INCHES                1.99       5.28       5.79           5.79
                  MM               50.50     134.18     146.98         146.98
               AC-FT               30525.     81102.     88836.         88836.
           THOUS CU M              37652.    100038.    109576.        109578.

                                   MAXIMUM STORAGE =       413.

 MAXIMUM STAGE IS      333.1

                                   STATION    6900, PLAN 4, RTIO 1

                                               OUTFLOW
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.       36.      175.
      362.      552.      653.      736.      724.      719.      698.      669.      634.      597.
      559.      522.      486.      452.      420.      390.      363.      338.      314.      293.
      273.      255.      239.      224.      210.      198.      186.      175.      166.      157.
      149.      141.      134.      128.      122.      117.      112.      107.      103.       99.
       95.       91.       88.       85.       82.       80.       77.       75.       73.       71.
       69.       67.       65.       64.       62.       61.       59.       58.       57.       56.
       55.       54.       53.       52.       52.       51.       50.       50.       49.       49.
```

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
45.	45.	45.	44.	44.	44.	44.	45.	45.	45.
46.	47.	48.	49.	51.	53.	56.	59.	62.	67.
72.	77.	84.	92.	101.	111.	122.	135.	150.	167.
186.	207.	232.	259.	289.	323.	361.	404.	451.	502.
559.	621.	688.	762.	841.	927.	1021.	1126.	1244.	1377.
1525.	1610.	1717.	1854.	2091.	2265.	2505.	2754.	3443.	4541.
5346.	5952.	6655.	7331.	8071.	8864.	9710.	10604.	11533.	12494.
13584.	14575.	15748.	16941.	18192.	19572.	21069.	22681.	24323.	26010.
27713.	28908.	29690.	30810.	32124.	33543.	35033.	36624.	38420.	40225.
41844.	43300.	44694.	46054.	47371.	48626.	49858.	51029.	52096.	53074.
53964.	54762.	55471.	56088.	56614.	57052.	57423.	57708.	94351.	169055.
145920.	78285.	63033.	57827.	56146.	56219.	55110.	54887.	53920.	53431.
52525.	51867.	50976.	50211.	49315.	48476.	47565.	46684.	45766.	44877.
43922.	42950.	42007.	41116.	40221.	39334.	38455.	37585.	36726.	35878.
35043.	34220.	33412.	32618.	31840.	31077.	30319.	29550.	28733.	27952.
27237.	26512.	25799.	25104.	24419.	23742.	23063.	22374.	21634.	20858.
20111.	19350.	18525.	17637.	16574.	15516.	14627.	13707.	12831.	12037.
11286.	10589.	9940.	9345.	8790.	8280.	7808.	7306.	6860.	6522.
6179.	5893.	5620.	5349.	5111.	4884.	4680.	4489.	4315.	4155.
4007.	3870.	3744.	3629.	3524.	3429.	3341.	3259.	3182.	3109.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.	1.	0.	0.	0.	0.	0.	0.	1.	3.
6.	9.	10.	11.	11.	11.	11.	10.	10.	9.
9.	8.	8.	7.	7.	6.	6.	5.	5.	5.
4.	4.	4.	3.	3.	3.	3.	3.	3.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	2.	2.	2.	2.	2.	3.
3.	3.	4.	4.	5.	5.	6.	6.	7.	8.
9.	10.	11.	12.	13.	14.	16.	18.	19.	21.
23.	25.	27.	29.	31.	32.	34.	36.	41.	49.
55.	60.	64.	69.	73.	78.	84.	89.	95.	101.
107.	114.	121.	128.	135.	143.	152.	162.	171.	181.
191.	197.	202.	208.	216.	224.	232.	241.	251.	261.
269.	277.	285.	293.	300.	306.	313.	319.	325.	330.
335.	339.	343.	346.	349.	351.	353.	354.	541.	879.
782.	461.	383.	355.	346.	347.	341.	340.	334.	332.
327.	323.	319.	315.	310.	305.	301.	296.	291.	286.
281.	276.	270.	265.	261.	256.	251.	246.	241.	237.
232.	227.	223.	219.	214.	210.	206.	201.	196.	192.
188.	184.	180.	176.	172.	168.	164.	160.	156.	151.
147.	142.	137.	132.	126.	119.	114.	108.	103.	98.
93.	89.	85.	81.	78.	75.	72.	68.	66.	43.

```
    61.      59.      57.      55.      53.      52.      50.      49.      47.      46.
    45.      44.      43.      42.      41.      41.      40.      40.      39.      38.

                                       STAGE
  316.0    316.0    316.0    316.0    316.0    316.0    316.0    316.0    316.0    316.0
  316.0    316.0    316.0    316.0    316.0    316.0    316.0    316.0    316.0    316.2
  316.5    316.7    316.8    316.9    316.9    316.9    316.9    316.8    316.8    316.7
  316.7    316.6    316.6    316.6    316.5    316.5    316.4    316.4    316.4    316.4
  316.3    316.3    316.3    316.3    316.3    316.2    316.2    316.2    316.2    316.2
  316.2    316.2    316.2    316.2    316.2    316.1    316.1    316.1    316.1    316.1
  316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1
  316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1
  316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1
  316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1
  316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1
  316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1    316.1
  316.1    316.1    316.1    316.1    316.1    316.1    316.2    316.2    316.2    316.2
  316.2    316.3    316.3    316.3    316.4    316.4    316.4    316.5    316.6    316.6
  316.7    316.8    316.9    316.9    317.0    317.1    317.3    317.4    317.5    317.7
  317.9    318.0    318.1    318.3    318.4    318.5    318.7    318.8    319.2    319.6
  320.2    320.6    320.8    321.1    321.4    321.6    321.9    322.3    322.6    323.0
  323.2    323.5    323.8    324.1    324.5    324.9    325.3    325.6    325.9    326.3
  326.7    326.9    327.1    327.3    327.6    327.8    328.1    328.4    328.7    329.0
  329.2    329.5    329.7    330.0    330.1    330.3    330.5    330.7    330.8    331.0
  331.1    331.2    331.3    331.4    331.5    331.5    331.6    331.6    336.0    342.3
  340.6    334.2    332.4    331.6    331.4    331.4    331.3    331.2    331.1    331.0
  330.9    330.8    330.7    330.6    330.4    330.3    330.2    330.0    329.9    329.8
  329.6    329.4    329.3    329.1    329.0    328.8    328.7    328.5    328.4    328.2
  328.1    327.9    327.8    327.7    327.5    327.4    327.2    327.0    326.9    326.7
  326.6    326.4    326.3    326.1    326.0    325.8    325.7    325.5    325.4    325.2
  325.0    324.8    324.6    324.3    324.0    323.8    323.5    323.3    323.0    322.8
  322.5    322.3    322.0    321.8    321.6    321.4    321.3    321.1    320.9    320.8
  320.7    320.5    320.4    320.2    320.1    320.0    319.9    319.8    319.7    319.6
  319.5    319.4    319.4    319.3    319.2    319.2    319.1    319.1    319.0    319.0

                         PEAK    6-HOUR   24-HOUR   72-HOUR   TOTAL VOLUME
                 CFS   169055.   66517.    41055.    14953.      4306434.
                 CMS     4787.    1884.     1163.      423.       121945.
              INCHES               2.15      5.30      5.80          5.80
                  MM              54.57    134.73    147.21        147.21
               AC-FT              32984.    81431.    88976.        88976.
           THOUS CU M             40685.   100443.   109750.       109750.

                        MAXIMUM STORAGE =        879.

MAXIMUM STAGE IS      342.3

                        STATION     69[illegible], PLAN 5, RTIO 1

                                  OUTFLOW
```

.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	36.	175.
592.	552.	653.	736.	724.	619.	698.	669.	634.	597.
559.	522.	486.	452.	421.	393.	363.	338.	314.	293.
275.	255.	239.	224.	211.	199.	186.	175.	166.	157.
149.	141.	134.	128.	122.	117.	112.	107.	103.	99.
95.	91.	88.	85.	82.	80.	77.	75.	73.	71.
69.	67.	65.	64.	62.	61.	59.	58.	57.	56.
55.	54.	53.	52.	52.	51.	50.	50.	49.	49.
48.	48.	47.	47.	47.	46.	46.	46.	45.	45.
45.	45.	45.	44.	44.	44.	44.	45.	45.	45.
46.	47.	48.	49.	51.	53.	56.	59.	62.	67.
72.	77.	84.	92.	101.	111.	122.	135.	150.	167.
186.	207.	232.	259.	289.	323.	361.	404.	451.	502.
559.	621.	688.	762.	841.	927.	1021.	1126.	1244.	1377.
1525.	1610.	1717.	1854.	2091.	2285.	2505.	2754.	3443.	4541.
5346.	5952.	6655.	7331.	8071.	8864.	9710.	10604.	11533.	12494.
13504.	14575.	15748.	16941.	18192.	19572.	21369.	22681.	24323.	26010.
27713.	28908.	29698.	30870.	32124.	33543.	35333.	36624.	38420.	40225.
41844.	43300.	44694.	46054.	47371.	48626.	49858.	51029.	52096.	53074.
53964.	54762.	55471.	56086.	56614.	57052.	57423.	57708.	62277.	72113.
87894.	87850.	86621.	91963.	106222.	102776.	78764.	57759.	54528.	53624.
52357.	52020.	50857.	50301.	49248.	48527.	47529.	46710.	45746.	44890.
43912.	42957.	42052.	41120.	40218.	39336.	38454.	37586.	36725.	35878.
35042.	34221.	33412.	32618.	31840.	31077.	30319.	29550.	28733.	27952.
27237.	26512.	25799.	25104.	24419.	23742.	23063.	22374.	21634.	20858.
20111.	19350.	18525.	17637.	16574.	15518.	14627.	13707.	12831.	12037.
11286.	10589.	9947.	9345.	8790.	8280.	7808.	7306.	6866.	6522.
6179.	5893.	5623.	5349.	5111.	4884.	4680.	4489.	4315.	4155.
4007.	3870.	3744.	3629.	3524.	3429.	3341.	3259.	3182.	3109.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	1.	3.
6.	9.	10.	11.	11.	11.	11.	10.	10.	9.
9.	8.	8.	7.	7.	6.	6.	5.	5.	5.
4.	4.	4.	3.	3.	3.	3.	3.	3.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	2.	2.	2.	2.	2.	3.
3.	3.	4.	4.	5.	5.	6.	6.	7.	8.
9.	10.	11.	12.	13.	14.	16.	18.	19.	21.
23.	25.	27.	29.	31.	32.	34.	36.	41.	49.
55.	60.	64.	69.	73.	78.	84.	89.	95.	101.
107.	114.	121.	128.	135.	143.	152.	162.	171.	181.
191.	197.	202.	208.	216.	224.	232.	241.	251.	261.

```
  269.      277.  [illegible]   293.  [illegible]   300.      313.      317.      325.  [illegible]
  335.      339.      343.      346.      349.      351.      353.      354.      379.      429.
  474.      509.      525.      529.      599.      583.      463.      355.      356.      333.
  326.      324.      316.      315.      310.      306.      300.      296.      291.      286.
  281.      276.      270.      265.      260.      256.      251.      246.      241.      237.
  232.      227.      223.      219.      214.      210.      206.      201.      196.      192.
  188.      184.      180.      176.      172.      168.      164.      160.      156.      151.
  147.      142.      137.      132.      126.      119.      114.      108.      103.       98.
   93.       89.       85.       81.       78.       75.       72.       68.       66.       63.
   61.       59.       57.       55.       53.       52.       50.       49.       47.       46.
   45.       44.       43.       42.       41.       41.       40.       40.       39.       38.

                                       STAGE
 316.0     316.0     316.0     316.0     316.0     316.0     316.0     316.0     316.0     316.0
 316.0     316.0     316.0     316.0     316.0     316.0     316.0     316.0     316.0     316.2
 316.5     316.7     316.8     316.9     316.9     316.9     316.9     316.8     316.8     316.7
 316.7     316.6     316.6     316.6     316.5     316.5     316.4     316.4     316.4     316.4
 316.3     316.3     316.3     316.3     316.3     316.2     316.2     316.2     316.2     316.2
 316.2     316.2     316.2     316.2     316.2     316.1     316.1     316.1     316.1     316.1
 316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
 316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
 316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
 316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
 316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
 316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
 316.1     316.1     316.1     316.1     316.1     316.1     316.2     316.2     316.2     316.2
 316.2     316.3     316.3     316.3     316.4     316.4     316.4     316.5     316.6     316.6
 316.7     316.8     316.9     316.9     317.0     317.1     317.3     317.4     317.5     317.7
 317.9     318.0     318.1     318.3     318.4     318.5     318.7     318.8     319.2     319.8
 320.2     320.6     320.8     321.1     321.4     321.6     321.9     322.3     322.6     323.0
 323.2     323.5     323.8     324.1     324.5     324.9     325.3     325.6     325.9     326.3
 326.7     326.9     327.1     327.3     327.6     327.8     328.1     328.4     328.7     329.0
 329.2     329.5     329.7     330.0     330.1     330.3     330.5     330.7     330.8     331.0
 331.1     331.2     331.3     331.4     331.5     331.5     331.6     331.6     332.3     333.5
 334.5     335.3     335.1     335.7     337.2     336.9     334.3     331.6     331.2     331.0
 330.9     330.6     330.6     330.6     330.4     330.3     330.2     330.1     329.9     329.8
 329.6     329.4     329.3     329.1     329.0     328.8     328.7     328.5     328.4     328.2
 328.1     327.9     327.8     327.7     327.5     327.4     327.2     327.0     326.9     326.7
 326.6     326.4     326.3     326.1     326.0     325.8     325.7     325.5     325.4     325.2
 325.0     324.8     324.6     324.3     324.0     323.8     323.5     323.3     323.0     322.8
 322.5     322.3     322.0     321.6     321.6     321.4     321.3     321.1     320.9     320.8
 320.7     320.5     320.4     320.2     320.1     320.0     319.9     319.8     319.7     319.6
 319.5     319.4     319.4     319.3     319.2     319.2     319.1     319.1     319.0     319.0

                     PEAK    6-HOUR    24-HOUR    72-HOUR   TOTAL VOLUME
           CFS    106222.    66397.     41025.     14943.       4303556.
           CMS      3008.     1880.      1162.       423.        121863.
        INCHES                2.14       5.30       5.79           5.79
            MM               54.47     134.63     147.11         147.11
         AC-FT               32924.     81371.     88916.         88916.
    THOUS CU M               40611.    100370.    109677.        109677.
```

MAXIMUM STORAGE = 599.

MAXIMUM STAGE IS 337.2

STATION 6900, PLAN 6, RTIO 1

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	36.	175.
382.	552.	653.	706.	724.	719.	698.	669.	634.	597.
559.	522.	486.	452.	420.	390.	363.	338.	314.	293.
273.	255.	239.	224.	210.	198.	186.	175.	166.	157.
149.	141.	134.	128.	122.	117.	112.	107.	103.	99.
95.	91.	88.	85.	82.	80.	77.	75.	73.	71.
69.	67.	65.	64.	62.	61.	59.	58.	57.	56.
55.	54.	53.	52.	52.	51.	50.	50.	49.	49.
48.	48.	47.	47.	47.	46.	46.	46.	45.	45.
45.	45.	45.	44.	44.	44.	44.	45.	45.	45.
46.	47.	48.	49.	51.	53.	56.	59.	62.	67.
72.	77.	84.	92.	101.	111.	122.	135.	150.	167.
186.	207.	232.	259.	289.	323.	361.	404.	451.	502.
559.	621.	688.	762.	841.	927.	1021.	1126.	1244.	1377.
1505.	1610.	1717.	1854.	2091.	2285.	2505.	2754.	3443.	4541.
5346.	5952.	6655.	7331.	8071.	8864.	9710.	10604.	11533.	12494.
13504.	14575.	15746.	16941.	18192.	19572.	21069.	22681.	24323.	26010.
27713.	28908.	29690.	30810.	32124.	33543.	35033.	36624.	38420.	40225.
41844.	43300.	44694.	46054.	47371.	48626.	49858.	51029.	52096.	53074.
53954.	54762.	55471.	56088.	56614.	57052.	57423.	57708.	58978.	61537.
63928.	65753.	67163.	68062.	68578.	69271.	66628.	62672.	63660.	67205.
71683.	74796.	74909.	72577.	68233.	63704.	59639.	56178.	50331.	45071.
44033.	43307.	41953.	41159.	40188.	39357.	38439.	37596.	36717.	35883.
35038.	34223.	33410.	32619.	31839.	31077.	30319.	29551.	28733.	27953.
27237.	26512.	25799.	25104.	24419.	23742.	23063.	22374.	21634.	20858.
20111.	19350.	18525.	17637.	16574.	15518.	14627.	13707.	12831.	12037.
11286.	10589.	9940.	9345.	8790.	8280.	7808.	7306.	6860.	6522.
6179.	5893.	5620.	5349.	5111.	4884.	4680.	4489.	4315.	4155.
4007.	3870.	3744.	3629.	3524.	3429.	3341.	3259.	3182.	3109.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	1.	3.
6.	9.	10.	11.	11.	11.	11.	10.	10.	9.
9.	8.	8.	7.	7.	6.	6.	5.	5.	5.
4.	4.	4.	3.	3.	3.	3.	3.	3.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.

```
    1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
    1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
    1.        1.        1.        1.        2.        2.        2.        2.        2.        3.
    3.        3.        4.        4.        5.        5.        6.        6.        7.        8.
    9.       10.       11.       12.       13.       14.       16.       18.       19.       21.
   23.       25.       27.       29.       31.       32.       34.       36.       41.       49.
   55.       60.       64.       69.       73.       78.       84.       89.       95.      101.
  107.      114.      121.      128.      135.      143.      152.      162.      171.      181.
  191.      197.      202.      208.      216.      224.      232.      241.      251.      261.
  269.      277.      285.      293.      300.      306.      313.      319.      325.      330.
  335.      339.      343.      346.      349.      351.      353.      354.      361.      375.
  387.      396.      404.      408.      411.      415.      401.      381.      386.      404.
  427.      443.      443.      432.      409.      386.      365.      346.      315.      287.
  282.      276.      270.      266.      260.      256.      251.      246.      241.      237.
  232.      227.      223.      219.      214.      210.      206.      201.      196.      192.
  188.      184.      180.      176.      172.      168.      164.      160.      156.      151.
  147.      142.      137.      132.      126.      119.      114.      108.      103.       98.
   93.       89.       85.       81.       78.       75.       72.       68.       66.       63.
   61.       59.       57.       55.       53.       52.       50.       49.       47.       46.
   45.       44.       43.       42.       41.       41.       40.       40.       39.       38.

                                         STAGE
316.0     316.0     316.0     316.0     316.0     316.0     316.0     316.0     316.0     316.0
316.0     316.0     316.0     316.0     316.0     316.0     316.0     316.0     316.0     316.2
316.5     316.7     316.8     316.9     316.9     316.9     316.9     316.8     316.8     316.7
316.7     316.6     316.6     316.6     316.5     316.5     316.4     316.4     316.4     316.4
316.3     316.3     316.3     316.3     316.3     316.2     316.2     316.2     316.2     316.2
316.2     316.2     316.2     316.2     316.2     316.1     316.1     316.1     316.1     316.1
316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1     316.1
316.1     316.1     316.1     316.1     316.1     316.1     316.2     316.2     316.2     316.2
316.2     316.3     316.3     316.3     316.4     316.4     316.4     316.5     316.6     316.6
316.7     316.8     316.9     316.9     317.0     317.1     317.3     317.4     317.5     317.7
317.9     318.0     318.1     318.3     318.4     318.5     318.7     318.8     319.2     319.6
320.2     320.6     320.8     321.1     321.4     321.6     321.9     322.3     322.6     323.0
323.2     323.5     323.8     324.1     324.5     324.9     325.3     325.6     325.9     326.3
326.7     326.9     327.1     327.3     327.6     327.8     328.1     328.4     328.7     329.0
329.2     329.5     329.7     330.0     330.1     330.3     330.5     330.7     330.6     331.0
331.1     331.2     331.3     331.4     331.5     331.5     331.6     331.6     331.8     332.2
332.5     332.7     332.9     333.0     333.0     333.1     332.8     332.3     332.4     332.9
333.4     333.6     333.6     333.5     333.0     332.4     331.9     331.4     330.6     329.6
329.6     329.4     329.3     329.1     329.0     328.6     328.7     328.5     328.4     328.2
328.1     327.9     327.8     327.7     327.5     327.4     327.2     327.0     326.9     326.7
326.6     326.4     326.3     326.1     326.0     325.8     325.7     325.5     325.4     325.2
325.0     324.8     324.6     324.3     324.0     323.8     323.5     323.3     323.0     322.8
322.5     322.3     322.0     321.7     321.6     321.4     321.3     321.1     320.9     320.8
320.7     320.5     320.4     320.2     320.1     320.0     319.9     319.6     319.7     319.6
```

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	74909.	64746.	40695.	14933.	4300682.
CMS	2121.	1833.	1161.	423.	121782.
INCHES		2.09	5.32	5.79	5.79
MM		53.12	134.53	147.01	147.01
AC-FT		32105.	81312.	88857.	88857.
THOUS CU M		39611.	100297.	109603.	109603.

MAXIMUM STORAGE = 443.

MAXIMUM STAGE IS 333.8

STATION 6900, PLAN 7, RTIO 1

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	36.	175.
382.	552.	653.	706.	724.	719.	698.	669.	634.	597.
559.	522.	486.	452.	420.	390.	363.	338.	314.	293.
273.	255.	239.	224.	210.	198.	186.	175.	166.	157.
149.	141.	134.	128.	122.	117.	112.	107.	103.	99.
95.	91.	88.	85.	82.	80.	77.	75.	73.	71.
69.	67.	65.	64.	62.	61.	59.	58.	57.	56.
55.	54.	53.	52.	52.	51.	50.	50.	49.	49.
48.	48.	47.	47.	47.	46.	46.	46.	45.	45.
45.	45.	45.	44.	44.	44.	44.	45.	45.	45.
46.	47.	48.	49.	51.	53.	56.	59.	62.	67.
72.	77.	84.	92.	101.	111.	122.	135.	150.	167.
186.	207.	232.	259.	289.	323.	361.	404.	451.	502.
559.	621.	688.	762.	841.	927.	1021.	1126.	1244.	1377.
1535.	1610.	1717.	1854.	2091.	2285.	2505.	2754.	3443.	4541.
5346.	5952.	6655.	7331.	8071.	8864.	9710.	10604.	11533.	12494.
13504.	14575.	15748.	16941.	18192.	19572.	21069.	22681.	24323.	26010.
27713.	28908.	29690.	30810.	32124.	33543.	35033.	36624.	38420.	40225.
41844.	43300.	44694.	46054.	47371.	48626.	49858.	51029.	52096.	53074.
53964.	54762.	55471.	56088.	56614.	57052.	57422.	57708.	121159.	231304.
134768.	40949.	59006.	57832.	54930.	56737.	54342.	54999.	53379.	53322.
52479.	51638.	50560.	49912.	48914.	48131.	47161.	46308.	45356.	44485.
43555.	42666.	41748.	40856.	39956.	39075.	38191.	37323.	36463.	35618.
34784.	33942.	33068.	32260.	31511.	30731.	29982.	29238.	28499.	27766.
27034.	26311.	25600.	24907.	24224.	23545.	22864.	22167.	21406.	20622.
19867.	19109.	18254.	17343.	16394.	15451.	14424.	13470.	12640.	11836.
11103.	10410.	9774.	9186.	8639.	8139.	7674.	7248.	6854.	6493.
6159.	5877.	5599.	5335.	5095.	4869.	4665.	4476.	4303.	4143.
3996.	3860.	3735.	3620.	3516.	3421.	3334.	3252.	3174.	3103.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

```
     6.      9.     10.     11.     11.     11.     11.     10.     10.      9.
     9.      8.      6.      7.      7.      6.      6.      5.      5.      5.
     4.      4.      4.      3.      3.      3.      3.      3.      3.      2.
     2.      2.      2.      2.      2.      2.      2.      2.      2.      2.
     1.      1.      1.      1.      1.      1.      1.      1.      1.      1.
     1.      1.      1.      1.      1.      1.      1.      1.      1.      1.
     1.      1.      1.      1.      1.      1.      1.      1.      1.      1.
     1.      1.      1.      1.      1.      1.      1.      1.      1.      1.
     1.      1.      1.      1.      1.      1.      1.      1.      1.      1.
     1.      1.      1.      1.      1.      1.      1.      1.      1.      1.
     1.      1.      1.      1.      2.      2.      2.      2.      2.      3.
     3.      3.      4.      4.      5.      5.      6.      6.      7.      8.
     9.     10.     11.     12.     13.     14.     16.     18.     19.     21.
    23.     25.     27.     29.     31.     32.     34.     36.     41.     49.
    55.     60.     64.     69.     73.     78.     84.     89.     95.    101.
   107.    114.    121.    128.    135.    143.    152.    162.    171.    181.
   191.    197.    202.    208.    216.    224.    232.    241.    251.    261.
   269.    277.    285.    293.    300.    306.    313.    319.    325.    330.
   335.    339.    343.    346.    349.    351.    353.    354.    671.   1116.
   733.    265.    361.    355.    340.    349.    337.    340.    331.    331.
   325.    322.    317.    313.    308.    304.    298.    294.    289.    284.
   279.    274.    269.    264.    259.    254.    249.    245.    240.    235.
   231.    226.    221.    217.    212.    208.    204.    199.    195.    191.
   187.    183.    176.    174.    171.    167.    163.    159.    154.    150.
   145.    141.    136.    130.    124.    119.    113.    107.    102.     97.
    92.     88.     84.     80.     77.     74.     71.     68.     66.     63.
    61.     59.     57.     55.     53.     52.     50.     49.     47.     46.
    45.     44.     43.     42.     41.     41.     40.     39.     39.     38.

                                     STAGE
 316.0   316.0   316.0   316.0   316.0   316.0   316.0   316.0   316.0   316.0
 316.0   316.0   316.0   316.0   316.0   316.0   316.0   316.0   316.0   316.2
 316.5   316.7   316.8   316.9   316.9   316.9   316.9   316.8   316.8   316.7
 316.7   316.6   316.6   316.6   316.5   316.5   316.4   316.4   316.4   316.4
 316.3   316.3   316.3   316.3   316.3   316.2   316.2   316.2   316.2   316.2
 316.2   316.2   316.2   316.2   316.2   316.1   316.1   316.1   316.1   316.1
 316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1
 316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1
 316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1
 316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1
 316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1
 316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1
 316.1   316.1   316.1   316.1   316.1   316.1   316.2   316.2   316.2   316.2
 316.2   316.3   316.3   316.3   316.4   316.4   316.4   316.5   316.6   316.6
 316.7   316.8   316.9   316.9   317.0   317.1   317.3   317.4   317.5   317.7
 317.9   318.0   318.1   318.3   318.4   318.5   318.7   318.8   319.2   319.8
 320.2   320.6   320.8   321.1   321.4   321.6   321.9   322.3   322.6   323.0
 323.2   323.5   323.8   324.1   324.5   324.9   325.3   325.6   325.9   326.3
 326.7   326.9   327.1   327.3   327.6   327.8   328.1   328.4   328.7   329.0
 329.2   329.5   329.7   330.0   330.1   330.3   330.5   330.7   330.8   331.
```

331.7	331.7	331.8	331.4	331.3	331.3	331.0	331.0	330.8	346.4
339.7	329.1	331.8	331.6	331.2	331.5	331.1	331.2	331.0	331.0
330.8	330.9	330.6	330.5	330.4	330.3	330.1	330.0	329.9	329.7
329.5	329.4	329.2	329.1	328.9	328.8	328.6	328.5	328.3	328.2
328.0	327.9	327.7	327.6	327.5	327.3	327.1	327.0	326.8	326.7
326.5	326.4	326.2	326.1	325.9	325.8	325.6	325.5	325.3	325.1
324.9	324.7	324.5	324.3	324.0	323.7	323.5	323.2	323.0	322.7
322.5	322.2	322.0	321.8	321.6	321.4	321.2	321.1	320.9	320.8
320.7	320.5	320.4	320.2	320.1	320.0	319.9	319.8	319.7	319.6
319.5	319.4	319.3	319.3	319.2	319.2	319.1	319.1	319.0	319.0

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	31304.	67933.	41279.	15021.	4325926.
CMS	6550.	1924.	1169.	425.	122496.
INCHES		2.19	5.33	5.82	5.82
MM		55.73	135.46	147.88	147.88
AC-FT		33686.	81876.	89379.	89379.
THOUS CU M		41551.	100992.	110247.	110247.

MAXIMUM STORAGE = 1116.

MAXIMUM STAGE IS 346.4

STATION 6[illegible] PLAN 8[illegible] RTIO 1

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	56.	175.
382.	552.	653.	706.	724.	719.	698.	669.	634.	597.
559.	522.	486.	452.	420.	390.	363.	338.	314.	293.
273.	255.	239.	224.	210.	198.	186.	175.	166.	157.
149.	141.	134.	128.	122.	117.	112.	107.	103.	99.
95.	91.	88.	85.	82.	80.	77.	75.	73.	71.
69.	67.	65.	64.	62.	61.	59.	58.	57.	56.
55.	54.	53.	52.	52.	51.	50.	50.	49.	49.
48.	48.	47.	47.	47.	46.	46.	46.	45.	45.
45.	45.	45.	44.	44.	44.	44.	45.	45.	45.
46.	47.	48.	49.	51.	53.	56.	59.	62.	67.
72.	77.	84.	92.	101.	111.	122.	135.	150.	167.
186.	207.	232.	259.	289.	323.	361.	404.	451.	502.
559.	621.	688.	762.	841.	927.	1021.	1126.	1244.	1377.
1505.	1610.	1717.	1854.	2041.	2285.	2505.	2754.	3443.	4541.
5346.	5952.	6655.	7331.	8071.	8864.	9710.	10604.	11533.	12494.
13514.	14575.	15748.	16941.	18192.	19572.	21069.	22681.	24323.	26010.
27713.	28908.	29697.	30810.	32124.	33543.	35033.	36624.	38420.	41225.
41644.	43300.	44694.	46054.	47371.	48626.	49858.	51029.	52296.	55074.
53964.	54762.	55471.	56188.	56614.	57056.	57422.	57755.	66249.	83121.
95413.	97026.	105199.	111547.	95093.	78711.	61346.	52821.	54111.	51033.
52223.	51549.	50627.	49668.	48946.	43108.	47178.	46295.	45371.	44478.
43559.	42662.	41751.	40854.	39958.	39072.	38192.	37323.	36464.	35618.

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34744.  33542.  33067.  32263.  31511.  30731.  29962.  29238.  28477.  27766.
27354.  26311.  25633.  24987.  24224.  23545.  22864.  22167.  21406.  20622.
19660.  19109.  18254.  17343.  16399.  15451.  14424.  13479.  12640.  11936.
11133.  10410.   9774.   9186.   8639.   8139.   7674.   7248.   6854.   6493.
 6159.   5877.   5599.   5333.   5093.   4869.   4665.   4476.   4305.   4143.
 3996.   3860.   3735.   3620.   3516.   3421.   3334.   3252.   3176.   3103.

                                     STAGE
    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
    0.      0.      0.      0.      0.      0.      0.      0.      1.      3.
    6.      9.     10.     11.     11.     11.     11.     10.     10.      9.
    9.      8.      6.      7.      7.      6.      6.      5.      5.      5.
    4.      4.      4.      3.      3.      3.      3.      3.      3.      2.
    2.      2.      2.      2.      2.      2.      2.      2.      2.      2.
    1.      1.      1.      1.      1.      1.      1.      1.      1.      1.
    1.      1.      1.      1.      1.      1.      1.      1.      1.      1.
    1.      1.      1.      1.      1.      1.      1.      1.      1.      1.
    1.      1.      1.      1.      1.      1.      1.      1.      1.      1.
    1.      1.      1.      1.      1.      1.      1.      1.      1.      1.
    1.      1.      1.      1.      1.      1.      1.      1.      1.      1.
    1.      1.      1.      1.      2.      2.      2.      2.      2.      3.
    3.      3.      4.      4.      5.      5.      6.      6.      7.      8.
    9.     10.     11.     12.     13.     14.     16.     18.     19.     21.
   23.     25.     27.     29.     31.     32.     34.     36.     41.     49.
   55.     60.     64.     69.     73.     78.     84.     89.     95.    101.
  107.    114.    121.    128.    135.    143.    152.    162.    171.    181.
  191.    197.    202.    208.    216.    224.    232.    241.    251.    261.
  269.    277.    285.    293.    300.    306.    313.    319.    325.    330.
  335.    339.    343.    346.    349.    351.    353.    354.    399.    485.
  546.    557.    594.    625.    545.    453.    374.    329.    335.    330.
  325.    322.    317.    313.    308.    303.    299.    294.    289.    284.
  279.    274.    269.    264.    259.    254.    249.    245.    240.    235.
  231.    226.    221.    217.    212.    208.    204.    199.    195.    191.
  187.    183.    178.    174.    171.    167.    163.    159.    154.    150.
  145.    141.    136.    130.    124.    119.    113.    107.    102.     97.
   92.     88.     84.     80.     77.     74.     71.     68.     66.     63.
   61.     59.     57.     55.     53.     52.     50.     49.     47.     46.
   45.     44.     43.     42.     41.     41.     40.     39.     39.     38.

                                     STAGE
  316.0   316.0   316.0   316.0   316.0   316.0   316.0   316.0   316.0   316.0
  316.0   316.0   316.0   316.0   316.0   316.0   316.0   316.0   316.0   316.2
  316.5   316.7   316.8   316.9   316.9   316.9   316.9   316.8   316.8   316.7
  316.7   316.6   316.6   316.6   316.5   316.5   316.4   316.4   316.4   316.4
  316.3   316.3   316.3   316.3   316.3   316.2   316.2   316.2   316.2   316.2
  316.2   316.2   316.2   316.2   316.2   316.1   316.1   316.1   316.1   316.1
  316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1
  316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1
  316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1
  316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1
  316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1
```

316.1	316.1	316.1	316.1	316.1	316.1	316.1	316.1	316.1	316.1
316.1	316.1	316.1	316.1	316.1	316.1	316.2	316.2	316.2	316.2
316.2	316.3	316.3	316.3	316.4	316.4	316.4	316.5	316.6	316.6
316.7	316.8	316.9	316.9	317.0	317.1	317.3	317.4	317.5	317.7
317.9	318.0	318.1	318.3	318.4	318.5	318.7	318.8	319.2	319.8
321.2	321.3	321.6	321.1	321.4	321.6	321.9	322.3	322.6	323.0
323.2	323.5	323.8	324.1	324.5	324.9	325.3	325.6	325.9	326.3
326.7	326.9	327.1	327.3	327.6	327.8	328.1	328.4	328.7	329.0
329.2	329.5	329.7	330.0	330.1	330.3	330.5	330.7	330.8	331.0
331.1	331.2	331.3	331.4	331.5	331.5	331.6	331.6	332.8	334.8
336.1	336.3	337.1	337.7	336.0	334.0	332.1	330.9	331.1	331.0
330.8	330.7	330.6	330.5	330.4	330.3	330.1	330.0	329.9	329.7
329.5	329.4	329.2	329.1	328.9	328.8	328.6	328.5	328.3	328.2
328.0	327.9	327.7	327.6	327.5	327.3	327.1	327.0	326.8	326.7
326.5	326.4	326.2	326.1	325.9	325.8	325.6	325.5	325.3	325.1
324.9	324.7	324.5	324.3	324.0	323.7	323.5	323.2	323.0	322.7
322.5	322.2	322.0	321.8	321.6	321.4	321.2	321.1	320.9	320.8
320.7	320.5	320.4	320.2	320.1	320.0	319.9	319.8	319.7	319.6
319.5	319.4	319.3	319.3	319.2	319.2	319.1	319.1	319.0	319.0

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	111547.	67084.	41067.	14950.	4305555.
CMS	3159.	1900.	1163.	423.	121920.
INCHES		2.17	5.31	5.79	5.79
MM		55.04	134.77	147.18	147.18
AC-FT		33265.	81455.	88956.	88958.
THOUS CU M		41032.	100473.	109726.	109728.

MAXIMUM STORAGE = 625.

MAXIMUM STAGE IS 337.7

STATION 6900, PLAN 9, RTIO 1

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	36.	175.
342.	552.	653.	706.	724.	719.	698.	669.	634.	597.
559.	522.	486.	452.	420.	390.	363.	338.	314.	293.
273.	255.	239.	224.	210.	198.	186.	175.	166.	157.
149.	141.	134.	128.	122.	117.	112.	107.	103.	99.
95.	91.	88.	85.	82.	80.	77.	75.	73.	71.
69.	67.	65.	64.	62.	61.	59.	58.	57.	56.
55.	54.	53.	52.	52.	51.	50.	50.	49.	49.
48.	48.	47.	47.	47.	46.	46.	46.	45.	45.
45.	45.	45.	44.	44.	44.	44.	45.	45.	45.
46.	47.	48.	49.	51.	53.	56.	59.	62.	67.
72.	77.	84.	92.	101.	111.	122.	135.	150.	167.
186.	207.	232.	259.	289.	323.	361.	404.	451.	502.
559.	621.	688.	762.	841.	927.	1021.	1126.	1244.	1377.

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5548.	5952.	6655.	7351.	8071.	8804.	9710.	10604.	11553.	12494.
13544.	14575.	15748.	16941.	18192.	19572.	21069.	22681.	24383.	26010.
27713.	28908.	29690.	30810.	32124.	33543.	35033.	36624.	38420.	40225.
41844.	43300.	44694.	46054.	47371.	48626.	49858.	51029.	52096.	53074.
53964.	54762.	55471.	56088.	56614.	57152.	57422.	57708.	60041.	64726.
68539.	71061.	72431.	73564.	73927.	66840.	70103.	76267.	79147.	77965.
74195.	69281.	64621.	61198.	58668.	56213.	53397.	50876.	46988.	44058.
43629.	42663.	41715.	40885.	39934.	39289.	38180.	37332.	36456.	35622.
34781.	33944.	33067.	32261.	31510.	30732.	29981.	29238.	28499.	27766.
27034.	26312.	25600.	24907.	24224.	23545.	22864.	22167.	21406.	20622.
19880.	19109.	18254.	17343.	16399.	15451.	14424.	13470.	12640.	11836.
11103.	10410.	9774.	9186.	8639.	8139.	7674.	7248.	6854.	6493.
6159.	5877.	5599.	5333.	5093.	4869.	4665.	4476.	4303.	4143.
3996.	3860.	3735.	3620.	3516.	3421.	3334.	3252.	3176.	3103.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	1.	3.
6.	9.	10.	11.	11.	11.	11.	10.	10.	9.
9.	8.	8.	7.	7.	6.	6.	5.	5.	5.
4.	4.	4.	3.	3.	3.	3.	3.	3.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	2.	2.	2.	2.	2.	3.
3.	3.	4.	4.	5.	5.	6.	6.	7.	8.
9.	10.	11.	12.	13.	14.	16.	18.	19.	21.
23.	25.	27.	29.	31.	32.	34.	36.	41.	49.
55.	60.	64.	69.	73.	78.	84.	89.	95.	101.
107.	114.	121.	128.	135.	143.	152.	162.	171.	181.
191.	197.	202.	208.	216.	224.	232.	241.	251.	261.
269.	277.	285.	293.	300.	306.	313.	319.	325.	330.
335.	339.	343.	346.	349.	351.	353.	354.	367.	391.
411.	424.	431.	437.	423.	402.	419.	450.	465.	459.
443.	415.	391.	373.	360.	347.	332.	318.	297.	282.
279.	274.	269.	264.	259.	254.	249.	245.	240.	235.
231.	226.	221.	217.	212.	208.	204.	199.	195.	191.
187.	183.	178.	174.	171.	167.	163.	159.	154.	150.
145.	141.	136.	130.	124.	119.	113.	107.	102.	97.
92.	88.	84.	80.	77.	74.	71.	68.	66.	63.
61.	59.	57.	55.	53.	52.	50.	49.	47.	46.
45.	44.	43.	42.	41.	41.	40.	39.	39.	38.

STAGE

316.0	316.0	316.0	316.0	316.0	316.0	316.0	316.0	316.0	316.0
316.0	316.0	316.0	316.0	316.0	316.0	316.0	316.0	316.0	316.2

```
[illegible] [illegible] [illegible] 316.9   316.9   316.9   316.9   316.8   316.8   316.7
316.7   316.6   316.6   316.6   316.5   316.5   316.4   316.4   316.4   316.4
316.3   316.3   316.3   316.3   316.3   316.2   316.2   316.2   316.2   316.2
316.2   316.2   316.2   316.2   316.2   316.1   316.1   316.1   316.1   316.1
316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1
316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1
316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1
316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1
316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1
316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1   316.1
316.1   316.1   316.1   316.1   316.1   316.1   316.2   316.2   316.2   316.2
316.2   316.3   316.3   316.3   316.4   316.4   316.4   316.5   316.6   316.6
316.7   316.8   316.9   316.9   317.0   317.1   317.3   317.4   317.5   317.7
317.9   318.0   318.1   318.3   318.4   318.5   318.7   318.8   319.2   319.8
320.2   320.6   320.8   321.1   321.4   321.6   321.9   322.3   322.6   323.0
323.2   323.5   323.8   324.1   324.5   324.9   325.3   325.6   325.9   326.3
326.7   326.9   327.1   327.3   327.6   327.8   328.1   328.4   328.7   329.0
329.2   329.5   329.7   330.0   330.1   330.3   330.5   330.7   330.8   331.0
331.1   331.2   331.3   331.4   331.5   331.5   331.6   331.6   332.0   332.6
333.0   333.3   333.5   333.6   333.3   332.8   333.2   334.0   334.3   334.2
333.7   333.1   332.6   332.1   331.8   331.4   331.0   330.6   330.1   329.6
329.6   329.4   329.2   329.1   328.9   328.8   328.6   328.5   328.3   328.2
328.0   327.9   327.7   327.6   327.5   327.3   327.1   327.0   326.8   326.7
326.5   326.4   326.2   326.1   325.9   325.8   325.6   325.5   325.3   325.1
324.9   324.7   324.5   324.3   324.0   323.7   323.5   323.2   323.0   322.7
322.5   322.2   322.0   321.8   321.6   321.4   321.2   321.1   320.9   320.8
320.7   320.5   320.4   320.2   320.1   320.0   319.9   319.8   319.7   319.6
319.5   319.4   319.3   319.3   319.2   319.2   319.1   319.1   319.0   319.0

                           PEAK    6-HOUR   24-HOUR   72-HOUR   TOTAL VOLUME
                  CFS    79147.    65642.    41507.    14930.       4299814.
                  CMS     2241.     1859.     1161.      423.        121757.
               INCHES                2.12      5.30      5.79           5.79
                   MM               53.85    134.57    146.98         146.98
                AC-FT              32550.    81336.    88839.         88839.
            THOUS CU M             40149.   100327.   109581.        109581.

                              MAXIMUM STORAGE =      465.

MAXIMUM STAGE IS     334.3


          **********        **********        **********        **********        **********
```

HYDROGRAPH AT	2.1	61.45	1 11739.
		(159.15)	(332.40)(
			2 11739.
			(332.40)(
			3 11739.
			(332.40)(
			4 11739.
			(332.40)(
			5 11739.
			(332.40)(
			6 11739.
			(332.40)(
			7 11739.
			(332.40)(
			8 11739.
			(332.40)(
			9 11739.
			(332.40)(
2 COMBINED	2.0	99.95	1 21500.
		(258.87)	(608.82)(
			2 21500.
			(608.82)(
			3 21500.
			(608.82)(
			4 21500.
			(608.82)(
			5 21500.
			(608.82)(
			6 21500.
			(608.82)(
			7 21500.
			(608.82)(
			8 21500.
			(608.82)(
			9 21500.
			(608.82)(
ROUTED TO	3.2	99.95	1 21247.
		(258.87)	(601.64)(
			2 21247.
			(601.64)(
			3 21247.
			(601.64)(
			4 21247.
			(601.64)(
			5 21247.
			(601.64)(
			6 21247.
			(601.64)(

			8 21247.
			(601.64)(
			9 21247.
			(601.64)(
HYDROGRAPH AT	3[illegible]	54.20	1 16122.
		(146.38)	(456.53)(
			2 16122.
			(456.53)(
			3 16122.
			(456.53)(
			4 16122.
			(456.53)(
			5 16122.
			(456.53)(
			6 16122.
			(456.53)(
			7 16122.
			(456.53)(
			8 16122.
			(456.53)(
			9 16122.
			(456.53)(
HYDROGRAPH AT	6[illegible]	46.25	1 11695.
		(119.79)	(331.17)(
			2 11695.
			(331.17)(
			3 11695.
			(331.17)(
			4 11695.
			(331.17)(
			5 11695.
			(331.17)(
			6 11695.
			(331.17)(
			7 11695.
			(331.17)(
			8 11695.
			(331.17)(
			9 11695.
			(331.17)(
ROUTED TO	3[illegible]6	46.25	1 11492.
		(119.79)	(325.41)(
			2 11492.
			(325.41)(
			3 11492.
			(325.41)(

			4 11492. (325.41)(
			5 11492. (325.41)(
			6 11492. (325.41)(
			7 11492. (325.41)(
			8 11492. (325.41)(
			9 11492. (325.41)(
HYDROGRAPH AT	700	41.00 (106.19)	1 5251. (148.69)(
			2 5251. (148.69)(
			3 5251. (148.69)(
			4 5251. (148.69)(
			5 5251. (148.69)(
			6 5251. (148.69)(
			7 5251. (148.69)(
			8 5251. (148.69)(
			9 5251. (148.69)(
ROUTED TO	700	41.00 (106.19)	1 3251. (92.06)(
			2 3251. (92.06)(
			3 3251. (92.06)(
			4 3251. (92.06)(
			5 3251. (92.06)(
			6 3251. (92.06)(
			7 3251. (92.06)(
			8 3251. (92.06)(
			9 3251. (92.06)(

ROUTED T	3	41.	1	3234.
		(1?0.1?)	(	91.58)(
			2	3234.
			(	91.58)(
			3	3234.
			(	91.58)(
			4	3234.
			(	91.58)(
			5	3234.
			(	91.58)(
			6	3234.
			(	91.58)(
			7	3234.
			(	91.58)(
			8	3234.
			(	91.58)(
			9	3234.
			(	91.58)(
HYDROGRAPH AT	5	19.00	1	5403.
		(49.21)	(	153.00)(
			2	5403.
			(	153.00)(
			3	5403.
			(	153.00)(
			4	5403.
			(	153.00)(
			5	5403.
			(	153.00)(
			6	5403.
			(	153.00)(
			7	5403.
			(	153.00)(
			8	5403.
			(	153.00)(
			9	5403.
			(	153.00)(
ROUTED TO	306	19.00	1	5375.
		(49.21)	(	152.19)(
			2	5375.
			(	152.19)(
			3	5375.
			(	152.19)(
			4	5375.
			(	152.19)(
			5	5375.
			(	152.19)(
			6	5375.
			(	152.19)(
			7	5375.

			(152.19)(
			8 5375.
			(152.19)(
			9 5375.
			(152.19)(
5 COMBINED	3[illegible]	260.40	1 54110.
		(674.43)	(1532.23)(
			2 54110.
			(1532.23)(
			3 54110.
			(1532.23)(
			4 54110.
			(1532.23)(
			5 54110.
			(1532.23)(
			6 54110.
			(1532.23)(
			7 54110.
			(1532.23)(
			8 54110.
			(1532.23)(
			9 54110.
			(1532.23)(
ROUTED T.	3[illegible]3	260.40	1 54086.
		(674.43)	(1531.54)(
			2 54086.
			(1531.54)(
			3 54086.
			(1531.54)(
			4 54086.
			(1531.54)(
			5 54086.
			(1531.54)(
			6 54086.
			(1531.54)(
			7 54086.
			(1531.54)(
			8 54086.
			(1531.54)(
			9 54086.
			(1531.54)(
HYDROGRAPH AT	40[illegible]	15.40	1 3655.
		(39.69)	(103.49)(
			2 3655.
			(103.49)(
			3 3655.
			(103.49)(
			4 3655.

			5	3655.
				(103.49)(
			6	3655.
				(103.49)(
			7	3655.
				(103.49)(
			8	3655.
				(103.49)(
			9	3655.
				(103.49)(
2 COMBINED	400	275.80	1	57473.
		(714.31)		(1627.46)(
			2	57473.
				(1627.46)(
			3	57473.
				(1627.46)(
			4	57473.
				(1627.46)(
			5	57473.
				(1627.46)(
			6	57473.
				(1627.46)(
			7	57473.
				(1627.46)(
			8	57473.
				(1627.46)(
			9	57473.
				(1627.46)(
ROUTED TO	415	275.80	1	57400.
		(714.31)		(1625.38)(
			2	57400.
				(1625.38)(
			3	57400.
				(1625.38)(
			4	57400.
				(1625.38)(
			5	57400.
				(1625.38)(
			6	57400.
				(1625.38)(
			7	57400.
				(1625.38)(
			8	57400.
				(1625.38)(
			9	57400.
				(1625.38)(
ROUTED T	534	275.80	1	55c38.

		([illegible])	([illegible])(
			8 55838.
			(1581.16)(
			3 55838.
			(1581.16)(
			4 55838.
			(1581.16)(
			5 55838.
			(1581.16)(
			6 55838.
			(1581.16)(
			7 55838.
			(1581.16)(
			8 55838.
			(1581.16)(
			9 55838.
			(1581.16)(
HYDROGRAPH AT	5.[illegible]	12.20	1 2796.
		(31.60)	(79.17)(
			2 2796.
			(79.17)(
			3 2796.
			(79.17)(
			4 2796.
			(79.17)(
			5 2796.
			(79.17)(
			6 2796.
			(79.17)(
			7 2796.
			(79.17)(
			8 2796.
			(79.17)(
			9 2796.
			(79.17)(
2 COMBINED	5.[illegible]	288.00	1 58095.
		(745.91)	(1645.07)(
			2 58095.
			(1645.07)(
			3 58095.
			(1645.07)(
			4 58095.
			(1645.07)(
			5 58095.
			(1645.07)(
			6 58095.
			(1645.07)(
			7 58095.
			(1645.07)(

		5 [illegible] (1645.37)(9 59095. (1645.37)(
ROUTED T[illegible]	5[illegible] [illegible].00 (745.91)	1 134702. (3814.33)(2 87498. (2475.11)(3 69015. (1954.30)(4 184515. (5224.89)(5 107147. (3034.06)(6 75103. (2126.68)(7 241471. (6837.70)(8 111976. (3171.81)(9 79195. (2242.54)(
ROUTED T[illegible]	50[illegible] [illegible].00 (745.91)	1 132300. (3746.32)(2 85816. (2430.04)(3 68852. (1949.66)(4 183811. (5204.93)(5 108275. (3066.00)(6 75006. (2123.93)(7 243771. (6902.82)(8 110150. (3119.10)(9 79400. (2248.36)(
ROUTED TO	69[illegible] 286.00 (745.91)	1 119509. (3384.12)(2 83666. (2369.17)(3 69048. (1955.23)(4 169055. (4787.09)(

5 [illegible]
(3007.87)(
6 74909.
(2121.17)(
7 231304.
(6549.78)(
8 111547.
(3158.67)(
9 79147.
(2241.20)(

PLAN 1 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	10034.	1134.4	49.75

PLAN 2 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	10034.	1134.4	49.75

PLAN 3 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	10034.	1134.4	49.75

PLAN 4 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	10034.	1134.4	49.75

PLAN 5 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	10034.	1134.4	49.75

PLAN 6 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS

RATIO	FLOW,CFS	STAGE,FT	HOURS
0.50	10034.	1134.4	49.75

PLAN 7 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	10034.	1134.4	49.75

PLAN 8 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	10034.	1134.4	49.75

PLAN 9 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	10034.	1134.4	49.75

PLAN 1 STATION 302

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	21247.	1015.5	51.50

PLAN 2 STATION 302

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	21247.	1015.5	51.50

PLAN 3 STATION 302

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	21247.	1015.5	51.50

PLAN 4 STATION 302

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	21247.	1015.5	51.50

PLAN 5 STATION 302

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	21247.	1015.5	51.50

PLAN 6 STATION 302

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	21247.	1015.5	51.50

PLAN 7 STATION 302

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	21247.	1015.5	51.50

PLAN 8 STATION 302

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	21247.	1015.5	51.50

PLAN 9 STATION 302

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	21247.	1015.5	51.5[illegible]

PLAN 1 STATION 306

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	11492.	1080.5	50.75

PLAN 2 STATION 306

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	11492.	1080.5	50.75

PLAN 3 STATION 306

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	11492.	1080.5	50.75

PLAN 4 STATION 306

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	11492.	1080.5	50.75

PLAN 5 STATION 306

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	11492.	1080.5	50.75

PLAN 6 STATION 306

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	11492.	1080.5	50.75

PLAN 7 STATION 306

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	11492.	1080.5	50.75

PLAN 8 STATION 306

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	11492.	1080.5	50.75

PLAN 9 STATION 306

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	11492.	1080.5	50.75

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1542.40	1542.40	1550.40
STORAGE	12260.	12260.	20748.
OUTFLOW	0.	0.	9975.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1546.40	0.00	16274.	3251.	0.00	61.00	0.00

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1542.40	1542.40	1550.40
STORAGE	12260.	12260.	20748.
OUTFLOW	0.	0.	9975.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1546.40	0.00	16274.	3251.	0.00	61.00	0.00

PLAN 3 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1542.40	1542.40	1550.40
STORAGE	12260.	12260.	20748.
OUTFLOW	0.	0.	9975.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1546.40	0.00	16274.	3251.	0.00	61.00	0.00

PLAN 4 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1542.40	1542.40	1550.40
STORAGE	12260.	12260.	20748.
OUTFLOW	0.	0.	9975.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1546.40	0.00	16274.	3251.	0.00	61.00	0.00

PLAN 5 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1542.40	1542.40	1550.40
STORAGE	12260.	12260.	20748.
OUTFLOW	0.	0.	9975.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1546.40	0.00	16274.	3251.	0.00	61.00	0.00

PLAN 6 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1542.40	1542.40	1550.40
STORAGE	12260.	12260.	20748.
OUTFLOW	0.	0.	9975.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1546.40	0.00	16274.	3251.	0.00	61.00	0.00

PLAN 7 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1542.40	1542.40	1550.40
STORAGE	12260.	12260.	20748.
OUTFLOW	0.	0.	9975.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1546.40	0.00	16274.	3251.	0.00	61.00	0.00

PLAN 8 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1542.40	1542.40	1550.40
STORAGE	12260.	12260.	20748.
OUTFLOW	0.	0.	9975.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1546.40	0.00	16274.	3251.	0.00	61.00	0.00

PLAN 9 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM

ELEVATION	1542.40	1542.40	1553.40	
STORAGE	12263.	12263.	20748.	
OUTFLOW	0.	0.	9975.	

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1546.43	0.00	16274.	3251.	0.00	61.00	0.00

PLAN 1 STATION 307

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	3234.	1148.1	62.00

PLAN 2 STATION 307

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	3234.	1148.1	62.00

PLAN 3 STATION 307

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	3234.	1148.1	62.00

PLAN 4 STATION 307

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	3234.	1148.1	62.00

PLAN 5 STATION 307

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	3234.	1148.1	62.00

PLAN 6 STATION 307

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	3234.	1148.1	62.00

PLAN 7 STATION 307

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	3234.	1148.1	62.00

PLAN 8 STATION 307

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	3234.	1148.1	62.00

PLAN 9 STATION 307

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	3234.	1148.1	62.00

PLAN 1 STATION 308

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	5375.	917.1	48.25

PLAN 2 STATION 308

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	5375.	917.1	48.25

PLAN 3 STATION 308

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	5375.	917.1	48.25

PLAN 4 STATION 308

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	5375.	917.1	48.25

PLAN 5 STATION 308

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	5375.	917.1	48.25

PLAN 6 STATION 308

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	5375.	917.1	48.25

PLAN 7 STATION 308

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	5375.	917.1	48.25

PLAN 8 STATION 308

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	5375.	917.1	48.25

PLAN 9 STATION 308

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	5375.	917.1	48.25

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	734.00	734.00	749.00
STORAGE	0.	0.	113.
OUTFLOW	0.	0.	8400.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	753.31	13.31	668.	54086.	26.25	51.50	0.00

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	734.00	734.00	749.00
STORAGE	0.	0.	113.
OUTFLOW	0.	0.	8400.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	753.31	13.31	668.	54086.	26.25	51.50	0.00

PLAN 3 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	734.00	734.00	749.00
STORAGE	0.	0.	113.
OUTFLOW	0.	0.	8400.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	753.31	13.31	668.	54086.	26.25	51.50	0.00

PLAN 4 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	734.00	734.00	749.00
STORAGE	0.	0.	113.
OUTFLOW	0.	0.	8400.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	753.31	13.31	668.	54086.	26.25	51.50	0.00

PLAN 5 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	734.00	734.00	740.
STORAGE	0.	0.	113.
OUTFLOW	0.	0.	8400.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	753.31	13.31	668.	54086.	26.25	50.50	0.00

PLAN 6 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	734.00	734.00	740.00
STORAGE	0.	0.	113.
OUTFLOW	0.	0.	8400.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	753.31	13.31	668.	54086.	26.25	50.50	0.00

PLAN 7 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	734.00	734.00	740.00
STORAGE	0.	0.	113.
OUTFLOW	0.	0.	8400.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	753.31	13.31	668.	54086.	26.25	50.50	0.00

PLAN 8 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	734.00	734.00	740.00
STORAGE	0.	0.	113.
OUTFLOW	0.	0.	8400.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	753.31	13.31	668.	54086.	26.25	50.50	0.00

PLAN 9 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM

ELEVATION	[illegible]	[illegible]	[illegible]	
STORAGE	[illegible]	[illegible]	113.	
OUTFLOW	[illegible]	[illegible]	8400.	

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
[illegible]	753.31	13.31	660.	54186.	26.25	[illegible]	[illegible]

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	661.80	657.30	665.80
STORAGE	3860.	3060.	4621.
OUTFLOW	7600.	0.	21000.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	670.93	5.13	5708.	57400.	20.00	50.50	0.00

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	661.80	657.30	665.80
STORAGE	3860.	3060.	4621.
OUTFLOW	7600.	0.	21000.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	670.93	5.13	5708.	57400.	20.00	50.50	0.00

PLAN 3 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	661.80	657.30	665.80
STORAGE	3860.	3060.	4621.
OUTFLOW	7600.	0.	21000.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	670.93	5.13	5708.	57400.	20.00	50.50	0.00

PLAN 4 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	661.80	657.30	665.80
STORAGE	3860.	3060.	4621.
OUTFLOW	7600.	0.	21000.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	670.93	5.13	5708.	57400.	20.00	50.50	0.00

PLAN 5 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	661.80	657.30	665.80
STORAGE	3860.	3080.	4621.
OUTFLOW	7600.	0.	21000.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	670.93	5.13	5708.	57400.	20.00	50.50	0.00

PLAN 6 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	661.80	657.30	665.80
STORAGE	3860.	3080.	4621.
OUTFLOW	7600.	0.	21000.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	670.93	5.13	5708.	57400.	20.00	50.50	0.00

PLAN 7 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	661.80	657.30	665.80
STORAGE	3860.	3080.	4621.
OUTFLOW	7600.	0.	21000.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	670.93	5.13	5708.	57400.	20.00	50.50	0.00

PLAN 8 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	661.80	657.30	665.80
STORAGE	3860.	3080.	4621.
OUTFLOW	7600.	0.	21000.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	670.93	5.13	5708.	57400.	20.00	50.50	0.00

PLAN 9 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM

ELEVATION	5001.3	5007.3	5009.1
STORAGE	5869.	5780.	4621.
OUTFLOW	7600.	0.	21700.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	5010.93	5.13	5708.	57400.	20.00	52.50	1.00

PLAN 1 STATION 504

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	55838.	5001.3	52.00

PLAN 2 STATION 504

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	55838.	5001.3	52.00

PLAN 3 STATION 504

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	55838.	5001.3	52.00

PLAN 4 STATION 504

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	55838.	5001.3	52.00

PLAN 5 STATION 504

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	55838.	5001.3	52.00

PLAN 6 STATION 504

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	55838.	5001.3	52.00

PLAN 7 STATION 504

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
[illegible]	55838.	5001.3	52.00

PLAN 8 STATION 504

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	55838.	5001.3	52.00

PLAN 9 STATION 504

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	55838.	5001.3	52.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	491.50	498.50	506.00
STORAGE	2487.	3717.	5866.
OUTFLOW	0.	0.	57115.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	508.09	0.09	5891.	134702.	0.85	52.50	52.00

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	491.50	498.50	506.00
STORAGE	2487.	3717.	5866.
OUTFLOW	0.	0.	57115.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	508.09	0.09	5892.	87408.	1.00	54.00	52.00

PLAN 3 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	491.50	498.50	506.00
STORAGE	2487.	3717.	5866.
OUTFLOW	0.	0.	57115.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	508.10	0.10	5892.	69203.	1.17	56.92	52.00

PLAN 4 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	491.50	498.50	506.00
STORAGE	2487.	3717.	5866.
OUTFLOW	0.	0.	57115.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	508.09	0.09	5891.	134515.	0.82	52.50	52.00

PLAN 5 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	491.50	498.50	508.00
STORAGE	2487.	3717.	5866.
OUTFLOW	0.	0.	57115.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	508.09	0.09	5891.	107147.	0.92	53.75	52.00

PLAN 6 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	491.50	498.50	508.00
STORAGE	2487.	3717.	5866.
OUTFLOW	0.	0.	57115.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	508.09	0.09	5891.	75243.	1.00	55.58	52.00

PLAN 7 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	491.50	498.50	508.00
STORAGE	2487.	3717.	5866.
OUTFLOW	0.	0.	57115.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	508.09	0.09	5891.	241882.	0.80	52.47	52.00

PLAN 8 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	491.50	498.50	508.00
STORAGE	2487.	3717.	5866.
OUTFLOW	0.	0.	57115.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	508.09	0.09	5891.	113588.	0.87	53.33	52.00

PLAN 9 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM

ELEVATION	491.5	496.5	5...	
STORAGE	2487.	3717.	5960.	
OUTFLOW	0.	0.	57115.	

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	506.09	1.09	5891.	79363.	0.92	54.67	52.00

PLAN 1 STATION 3600

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	132300.	347.3	52.50

PLAN 2 STATION 3600

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	85816.	344.0	54.00

PLAN 3 STATION 3600

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	68852.	342.6	57.00

PLAN 4 STATION 3600

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	183811.	350.5	52.50

PLAN 5 STATION 3600

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	108275.	345.7	53.75

PLAN 6 STATION 3600

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	75006.	343.1	55.50

PLAN 7 STATION 3600

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.50	243771.	356.7	52.50

PLAN 8 STATION 3600

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	110150.	345.8	53.50

PLAN 9 STATION 3600

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	79400.	343.5	54.75

PLAN 1 STATION 6900

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	119509.	338.4	52.50

PLAN 2 STATION 6900

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	83666.	334.8	54.25

PLAN 3 STATION 6900

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	69948.	333.1	57.00

PLAN 4 STATION 6900

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.50	169 55.	342.3	52.50

PLAN 5 STATION 6900

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	106222.	337.2	53.75

PLAN 6 STATION 6900

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	74969.	333.8	55.75

PLAN 7 STATION 6900

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	231304.	346.4	52.50

PLAN 8 STATION 6900

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	111547.	337.7	53.50

PLAN 9 STATION 6900

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	79147.	334.3	54.75

APPENDIX D

REFERENCES

APPENDIX D

REFERENCES

1. Department of the Army, Office of the Chief of Engineers. National Program of Investigation of Dams; Appendix D: Recommended Guidelines for Safety Inspection of Dams, 1976.

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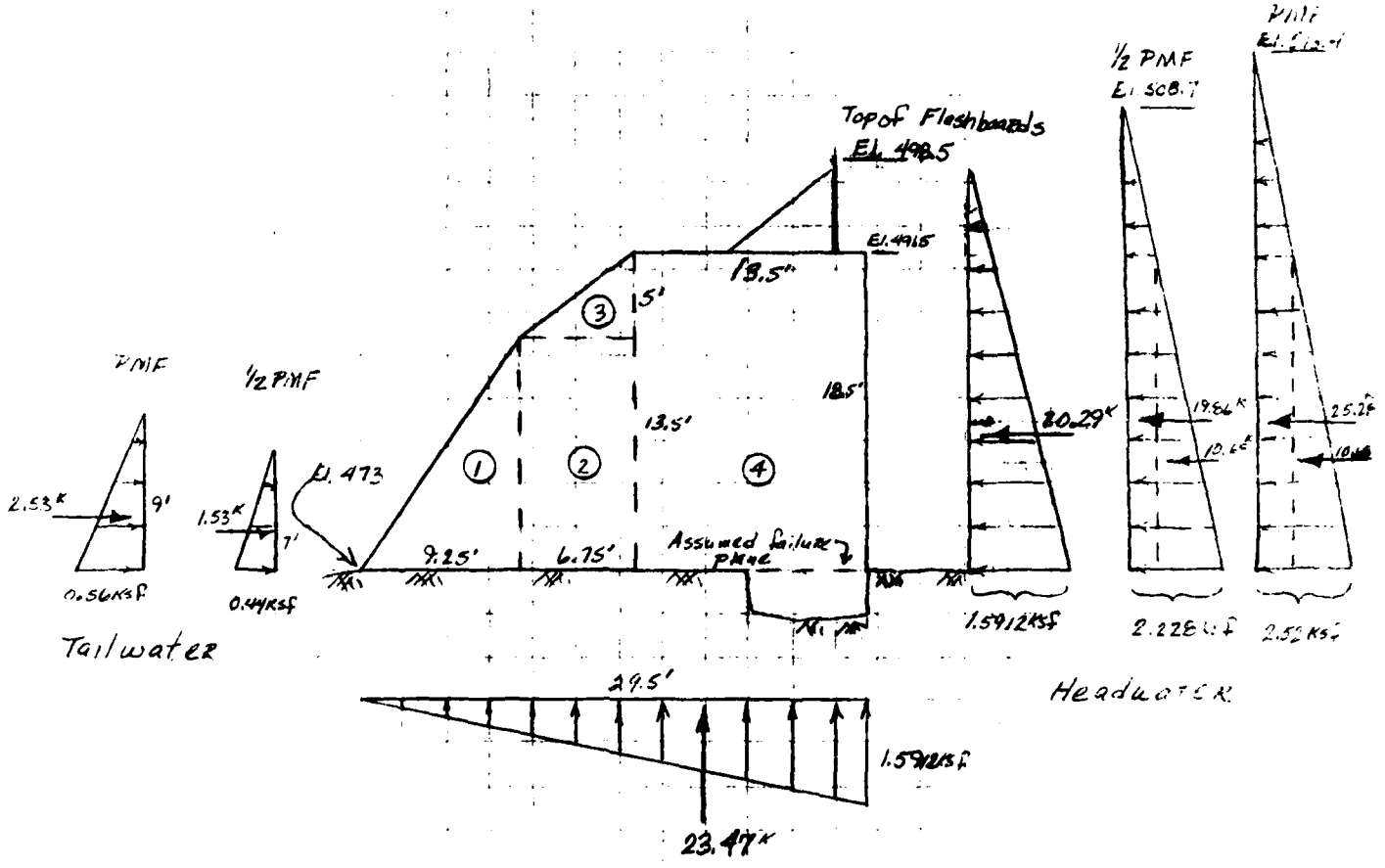
APPENDIX E

STABILITY ANALYSIS

PROJECT NAME U. S. Dam Inspections 1981 DATE

SUBJECT E. Canada Creek Dam PROJECT NO.

Stability DRAWN BY L



Wt. of Dam

① ½ (9.25')(13.5')(1')(0.15 KCF) = 9.366K

② (6.75')(13.5')(1')(0.15 KCF) = 13.669K

③ ½ (6.75')(5')(1')(0.15 KCF) = 2.531K

④ 13.5'(18.5')(1')(0.15 KCF) = 37.463K

63.03K

Summing Moments about the toe of dam

Resisting moment due to dam wt.

M_R = 9.366K(⅔ * 9.25') + 13.669K(9.25' + ½ * 6.75') + 2.531K(9.25' + ⅔ * 6.75') + 37.463K(16' + ½ * 13.5') = 57.8 + 172.6 + 34.8 + 852.3

M_R = 1117.4 I-K

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PROJECT NAME N.Y.S. Dam Inspections 1981 DATE
SUBJECT Beardslee Falls Dam PROJECT NO
DRAWN BY JAG

$$\bar{X} = \frac{M_D}{W_D} = \frac{1117.4^{1-K}}{63.03^K} = 17.73' \text{ from toe}$$

$$\bar{Y}_{\text{from toe}} = \frac{9.366^K\left(\frac{13.5'}{2}\right) + 13.664^K\left(\frac{13.5'}{2}\right) + 2.531^K\left(13.5' + 6'/3\right) + 37.4163^K\left(18.5'/2\right)}{63.03^K}$$

$$= \frac{42.17 + 92.27 + 38.39 + 346.53}{63.03^K} = \frac{519.33^{1-K}}{63.03^K} = 8.24'$$

Uplift Moment

$M_{o_{up}} = 23.47^K(2/3 * 29.5') = 461.6^{1-K}$

$\Sigma V = 63.03^K - 23.47^K = 39.56^K$

Case I Normal Pool (@ Elev. 496.5) - Summer Pool

a) Overturning

Overturning Moment due to U/S water
$= 20.29^K(23.5'/3) = 172.4^{1-K}$

Total Overturning Moment
$M_o = 461.6^{1-K} + 172.4^{1-K} = 634^{1-K}$

$F.S. = \frac{M_R}{M_o} = \frac{1117.4^{1-K}}{634^{1-K}} = 1.76$

Position of Resultant

$d = \frac{\Sigma M}{\Sigma V} = \frac{1117 - 634^{1-K}}{39.56^K} = \frac{483^{1-K}}{39.56^K} = 12.2' = \frac{12.2'}{29'} = 0.416$

O.K., inside middle third

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PROJECT NAME N.Y.S. Dam Inspections 1981 DATE

SUBJECT Beardslee Falls PROJECT NO.

DRAWN BY JAG

ii) Sliding

$$F.S. = \frac{\mu N + CA + \text{T.W. Force}}{\text{driving force}}$$

$$F.S. = \frac{0.65(39.6^k) + (0.05 ksi)(144\ in^2/ft^2)(1')(29.5') + 0}{20.29^k}$$

$$F.S. = \frac{25.7 + 212.4}{20.29} = 11.7$$

* Case II Winter Pool with Ice (water level 5' below crest)

Ice Force = 7.5^k @ Elev. 491

$M_{Ice} = 7.5^k(18') = 135^{ft\text{-}k}$

Total $M_o = 135^{ft\text{-}k} + 461.6^{ft\text{-}k} + 10.68^k(18.5'/3) = 662.5^k$

i) Overturning

$$F.S. = \frac{1117.4^{ft\text{-}k}}{662.5^{ft\text{-}k}} = 1.69$$

Position of Resultant

$$d = \frac{1117.4 - 662.5^{ft\text{-}k}}{39.56^{ft\text{-}k}} = 11.5' = 0.39\,b$$ O.K., within middle 4.RS

ii) Sliding

$$F.S. = \frac{25.7^k + 212.4^k}{10.68^k + 7.5^k} = 13.1$$

* Assumes uplift same as Case I [illegible] without uplift may decrease with [illegible] pool elevation to spillway crest

PROJECT NAME N.Y.S. Dam Inspections 1981 DATE

SUBJECT Beardslee Falls PROJECT NO.

DRAWN BY JAG

Case III 1/2 PMF (Assuming Uplift same as Case I)

i) Overturning

Overturning moment due to 4/s water
= 19.86^K (18.5'/2) + 65.86^{1-K} = 249.6^{1-K}
total M_O = 249.6^{1-K} + 461.6^{1-K} = 711^{1-K}
Resisting moment due to Tailwater (Considering only horizontal component)

1.53^K (7'/3) = 3.6^{1-K}
total M_R = 1117.4 + 3.6^{1-K} = 1121^{1-K}

$$F.S. = \frac{1121^{1-K}}{711^{1-K}} = 1.58$$

Position of Resultant

$$d = \frac{\Sigma M}{\Sigma V} = \frac{1121^{1-K} - 711^{1-K}}{39.56^K} = 10.37' = 0.35b$$

O.K. inside middle third

ii) Sliding

$$F.S. = \frac{25.7^K + 212.4^K + 1.53^K_{T.W.}}{19.86^K + 10.68^K} = 7.8$$

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PROJECT NAME N.Y.S. Dam Inspections 1981 DATE
SUBJECT Ecardsles Falls PROJECT NO
DRAWN BY

Case IV PMF (Assuming uplift same as Case II)

a) Overturning

Overturning moment due to H/S water
$= 25.28^K (18.5'/2) + 65.86^{1-K} = 299.7^{1-K}$
total $M_o = 299.7^{1-K} + 461.6^{1-K} = 761^{1-K}$
Resisting moment due to Tailwater (Considering horizontal component)
$2.53^K (9'/3) = 7.6^{1-K}$
total $M_R = 7.6^{1-K} + 1117.4^{1-K} = 1125^{1-K}$

$$F.S. = \frac{1125^{1-K}}{761^{1-K}} = 1.48$$

Position of Resultant

$$d = \frac{1125^{1-K} - 761^{1-K}}{39.56^K} = 9.2' = 0.31\,b$$ Just outside middle third

a.1) Sliding

$$F.S. = \frac{25.7^K + 212.4^K + 2.53^K}{25.28^K + 10.68^K} = 6.7$$ T.W.

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PROJECT NAME N.Y.S. Dam Inspections 1981 DATE

SUBJECT Canistear Falls Dam PROJECT NO

Stability DRAWN BY

Case V Seismic Load (Zone 2 HORIZ. E.Q. Coeff. 0.05 Vert E.Q. Coeff. 0.025)

a) Add'l overturning moment due to accel. of gravity loads

$0.05\,(519.33^{k}) + 0.025(1117.4^{k}) = 26^{k} + 28^{k} = 53.9^{k}$

Effective Σ vert. loads

$\Sigma V = 39.56^{k} - 0.025(63.03^{k}) = 38.0^{k}$

b) Add'l moment due to hydrodynamic effect of the reservoir (Ref. "Design of Small Dams")

$P_e = C\lambda w h = 0.73\,(0.05)(0.0624^{k/ft^3})(25.5'\ \text{water depth}) = 1.08^{k}$

$V_e = 0.726\,P_e = 0.726(0.0581^{k/ft}\ (25.5') = 1.08^{k}$

$M_e = V_e \bar{y} = 1.08^{k}\,(25.5' * 0.4118) = 11.3^{ft\text{-}k}$

c) Overturning

$$F.S. = \frac{1117.4^{ft\text{-}k}}{53.9^{ft\text{-}k} + 11.3^{ft\text{-}k} + 634^{ft\text{-}k}} = \frac{1117.4}{699.2} = 1.60$$

Position of Resultant

$$d = \frac{\Sigma M}{\Sigma V} = \frac{1117.4^{ft\text{-}k} - 699.2^{ft\text{-}k}}{38^{k}} = 11.0' = 0.37\,b$$

middle third

d) Sliding

$$F.S. = \frac{0.65(38^{k}) + 212.4^{k}}{20.29^{k} + 1.08^{k} + 0.05\,(63.03^{k})} = \frac{237.1^{k}}{24.5^{k}} = 9.7$$

APPENDIX F

PREVIOUS INSPECTION REPORTS/AVAILABLE DOCUMENTS

started in the present stream bed near the upstream toe of the portion marked 'Gravel' and Miscellaneous Fill by dumping from a trestle a mixture of gravel, sand, earth and clay until a sufficient height to form a pond on the upstream side is obtained. A hydraulic monitor mounted on a barge will then play water on additional fill as it is dumped thus classifying it and slucing the finer particles toward the upstream face of the dam.

The proportions of gravel and sand and clay to be used in the impervious portion of the dam will be determined if possible by a study of the voids in the sand and gravel banks to be used and certainly by actual experiments throughout the course of the work.

This process will be continued throughout the Dam, the trestles for bringing the fill in being raised in approximately 20' lifts and moved from time to time to enable the various types of material to be graded properly from coarse and pervious on the downstream face to fine and impervious on the upstream. The intention is that the upper third of the dam shall be so compacted by hydraulic processes that it will form an impervious layer. The quantity and pressure of water and the direction and point of application of the stream shall be regulated according to the nature of the material so as to obtain the best possible distribution of material.

The deposit of material from the trestles and the sluicing shall at all times be done in such a manner as to permit compacting by water as close as practicable to the lines indicated in the cross section of the fill, and posts and sheeting or gravel ridges or brush on the upstream face may be used to assist in achieving this object. The upstream face may be covered with a layer of gravel or rock to add stability and uniformity to its slope.

While no dams of this design have been built in New York State we have the advantage of considerable recent experience in other states. Special reference is made to the Miami Conservancy District dams in Ohio where the semi-hydraulic puddle was extensively utilized and to the Davis Bridge Dam now being built on the Deerfield River in Vermont. Engineers from our office have visited both of these works during construction and the universal opinion is that fill placed by this method is the most impervious and the safest yet devised for use in an earth dam.

The east side of the steam affords abundant sand and gravel particularly suitable for the pervious portion of the dam and there are indications that clay may also be available on this side. On the west side there is a shale bedrock west of the intake and this is overlain with clay in quantities probably sufficient for making the upper one third of the dam impervious.

The dyke at the east end of the main earth fill is along a gravel surface under which the bedrock has not yet been found and where it may not be found at any reasonable depth. The gravel however was originally deposited by water and is very compact although doubtless somewhat pervious to water.

If a cut throughout the length of the dyke shows a structure as tight as the deposit now exposed at the end of the exploration trench there might be some seepage under the dyke but probably not in any serious volume. At the end of the exploration trench an excellent bed of impervious clay lies between the sand and the bedrock. and our expectation is that this bed of clay may feasibly be reached with a steam shovel trench to be refilled with impervious material. This trench filling would be integral with the impervious upper third of the dyke. The present plan for the construction of this dyke is similar to that used on the main dam although in view of the smaller quantities involved it may be found preferable to modify this plan.

The dyke at the west end of the dam is expected to work out very closely parallel to the east dyke. The test pits dug to date indicate a clay bed closer to the surface than on the east end.

The engineers in charge of this work are mature men of broad experience in hydraulic engineering. This firm is the Power Company's Consulting Engineer and our president Mr. F. O. Blackwell was a consulting engineer on the Necaxa Dam (Mexico). This dam, built fifteen or twenty years ago, was one of the first high dams (180') by the hydraulic fill method, and Mr. Blackwell's experience at Necaxa has given him confidence in this type of construction and he has used it in his more recent experience whenever feasible.

Mr. L.A.Whitsit the Hydraulic Engineer of the Power Company will be in direct supervision of the construction. He was for several years in the U.S.Forest service and in that capacity inspected and reported on several dams using the hydraulic method of placing materials as for instance part of the Elephant Butte Dam and the Calaveras dam near San Francisco. Later while he was engaged in the superpower

survey he was detailed to make an investigation and report on the Miami Conservancy District dams. He is an able and extremely conscientious engineer and we are confident that acquaintance with him will confirm our opinion that he is a safe man to have in charge of the Beardslee Falls dam.

The Power Company's inspecting engineer has not yet been employed but we have in mind securing, if possible, the services of one of the younger men from the Davis Bridge or Miami jobs.

With this description and having in mind that our intention as Consulting Engineers, and the intention of the Engineers and Officers of the Power Company is to build a dam which will be absolutely safe, we trust you will approve the plan for this dam and let us get construction plans made at once.

Yours very truly,

VIELE, BLACKWELL & BUCK

By L G Buck

LJB/HH.

TELEPHONE
HANOVER 2142

VIELÉ, BLACKWELL & BUCK
ENGINEERS
49 WALL STREET NEW YORK

CABLE ADDRESS:
HYDROELEC, NEW YORK

August 20, 1923.

Dwight B. LaDu, Esq.,
Telephone Building,
Albany, N.Y.

Dear Sir:-

Attention: Mr.A.R.McKim

Dam #554 Mohawk
Adirondack P&L Corp.
Beardsley Falls

With further reference to our letter of August 9th and your reply of August 14th we are attaching hereto a blue print of a revised design of the earth fill dam of this project.

In making this revision we have endeavored to meet your criticism of our earlier design in so far as it was unprecedented and in the present design have followed the practise used both at David Bridge and Miami conservancy dams by putting the hydraulically puddled core wall in the center of the dam instead of on the upstream face. The methods used in construction would closely parallel those used at Davis Bridge except, of course, that we should plan to have the puddled material extend entirely across the width of the dam.

For handling the water during the construction period we have in mind making an open cut in the limestone starting about 175' upstream from the upstream face of the spillway and running thence to the second spillway section west of the river and from this point running either a tunnel or an open cut to the river bank about 175' down stream from the upstream face of the spillway.

The lower end of the open cut would be equipped with guides for stop logs and the upper end of the spillway would be enlarged so that when the earth dam has reached an elevation of about 485 or 490 a plug of concrete will be poured in the upper end of the tunnel and the water diverted over the spillway bed rock.

The power plant at Inghams Mills with its substantial storage puts us in a position to hold back the

natural flow of the stream at will so that handling water on this job should be comparatively simple.

The General Superintendent of the Power Company has asked that we go over this design with you tomorrow in order that an understanding as to its approval may be had as soon as possible.

Very truly yours,

VIELE, BLACKWELL & BUCK

By

LJB/M

Encl.

DEPARTMENT OF STATE ENGINEER AND SURVEYOR

Albany, N. Y., Aug 21 1913.

[illegible] constructing dam No. 554

[illegible] Mohawk [illegible] Water [illegible]

[illegible] pursuance of Chapter 65 of the Consolidated Laws and [illegible] 1911 Section 22, as [illegible] I.

Arnold H. Chapman
Deputy State Engineer

[illegible] to the approval.

Alex Rice McPherson
[illegible] of Dams and Dams

3-14-22-1000 (6-2749)

STATE OF NEW YORK
DEPARTMENT OF

State Engineer and Surveyor

ALBANY

Received July 25 1923 Dam No. 55-1 Mohawk Watershed

Disposition Approved Aug 21 1923 - March 7 1924 Serial No. 522-554
June 3 1924, July 1 1924 - July 11 1924 - August 1924, Nov VI

Site inspected

Foundation inspected

Structure inspected

Application for the Construction or Reconstruction of a Dam

Application is hereby made to the State Engineer, Albany, N. Y., in compliance with the provisions of Chapter LXV of the Consolidated Laws and Chapter 647, Laws of 1911, Section 22 as amended, for the approval of specifications and detailed plans, marked R-7232 Adirondack Power & Light Corporation, Beardslee Falls Development - Viele, Blackwell & Buck, Consulting Engrs. herewith submitted for the {construction / reconstruction} of a dam located as stated below. All provisions of law will be complied with in the erection of the proposed dam.

1. The dam will be on East Canada Creek branch of Mohawk River in the town of Manheim & St. Johnsville, County of Herkimer and Montgomery and one mile north of East Creek station of the N.Y.C.R.R.
(Give exact distance and direction from a well-known bridge, dam, village, main cross-roads or mouth of a stream)

2. The name and address of the owner is Adirondack Power & Light Corp., Schenectady, N.Y.

3. The dam will be used for Hydro-electric power station

4. Will any part of the dam be built upon or its pond flood any State lands? No

5. The watershed at the proposed dam draining into the pond to be formed thereby is 290 sq.mi. square miles.

6. The proposed dam will have a pond area at the spillcrest elevation of 460 acres and will impound 500,000,000 cubic feet of water.

7. The lowest part of the natural shore of the pond is over 10 feet vertically above the spillcrest, and everywhere else the shore will be at least 10 feet above the spillcrest.

8. The maximum known flow of the stream at the dam site was 13,000 cubic feet per second in 1913
(Date)

9. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the proposed dam probably not

10. The natural material of the bed on which the proposed dam will rest is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.) principally on limestone

11. The material of the right bank, in the direction with the current, is limestone at the spillcrest elevation this material has a top slope of 1 inches vertical to a foot horizontal on the center line of the dam, a vertical thickness at this elevation of 7 feet, and the top surface extends for a vertical height of over 10 feet above the spillcrest. indefinitely large

12. The material of the left bank is limestone has a top slope of 1 inches to a foot horizontal, a thickness of 7 feet, and a height of over 10 feet. indefinitely large

13. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing, effect of exposure to air and to water, uniformity, etc. Bed is good limestone in horizontal bed, satisfactorily compact and only very slightly affected by exposure to air and water. On both banks the limestone is covered with sandy soil.

14. If the bed is in layers, are the layers horizontal or inclined? horizontal. If inclined what is the direction of the slope relative to the center line of the dam and the inches vertical to a foot horizontal?

15. What is the thickness of the layers? Variable

16. Are there any porous seams or fissures? Not to our knowledge

17. WASTES. The spillway of the above proposed dam will be 243 feet long in the clear; the waters will be held at the right end by a concrete pier wall the top of which will be 14.5 feet above the spillcrest, and have a top width of 3 1/2 feet; and at the left end by a concrete retaining dam the top of which will be 10 feet above the spillcrest, and have a top width of 15 feet. In addition to this 243' a Taintor gate 20'wide & 9'high will assist in water control.

18. There will be also for flood discharge a pipe none inches in diameter and the bottom will be feet below the spillcrest, a sluice or gate feet wide in the clear by feet high, and the bottom will be feet below the spillcrest.

19. APRON. Below the proposed dam there will be an apron built of None required, feet long, feet wide and feet thick. The downstream side of the apron will have a thickness of feet for a width of feet.

20. PLANS. Each application for a permit of a dam over 12 feet in height must be accompanied by a location map and complete working drawings of the proposed structure. Each drawing should have a title giving the parts shown, the name of the town and county in which the dam site is located, and the name of the owner and of the engineer.

The location map (U. S. Geological Quadrangle or other map) should show the exact location of the proposed dam; of buildings below the dam which might be damaged by any failure of the dam; of roads adjacent to or crossing the stream below the dam, giving the lowest elevation of the roadway above the stream bed and giving the shape, the height and the width of stream openings; and of any embankments or steep slopes that any flood could pass over. Also indicate the character and use made of the ground.

The complete working drawings should give all the dimensions necessary for the calculations of the stability of the structure, and all the information asked for below under "Sketches." There may be attached to the plans any written reports, calculations, investigations or opinions that may aid in showing the data and method used by the designer.

21. SKETCHES. For small and unimportant structures, if plans have not been made, on the back sheet of this application make a sketch to scale for each different cross-section at the highest point; showing the height and the depth from the surface of the foundation, the bottom width, the top width (for a concrete or masonry spill at 18 inches below the crest), the elevation of the top in reference to the spillcrest, the length of the section, and the material of which the section is to be constructed. Mark each section with a capital letter. Also sketch a plan; show the above sections by their top lines, giving the mark and the length of each; the openings by their horizontal dimensions; and the abutments by their top width and top lengths from the upstream face of the spillcrest and give the elevation of the top in reference to the spillcrest.

22. ELEVATIONS. Also give the elevations, if possible from the Mean Sea Level, of at least two permanent Bench Marks; of the spillcrest for any existing dam on the proposed dam site, at the middle and at both ends of the spill; and of the spillcrest for the above proposed dam.

23. SAMPLES. When so instructed, send samples of the materials to be used in the construction of the proposed dam, using shipping tags which will be furnished. For sand one-half a cubic foot is desired; for cement, three pints; and for the natural bed, twenty cubic inches.

24. INSPECTION. State how inspection is to be provided for during construction.....

The dam will be built under the direct supervision of the Engineering Department of the Adirondack Power & Light Corp. which will arrange for State Inspection at the convenience of the State Engineers.

September 19,1923.

Dam 554,Mohawk.

Viele,Blackwell & Buck,
49 Wall Street,
New York City.

Gentlemen:

We have received yours of September 13th, concerning the Beardslee Falls dam with a sketch of the spillway crest,giving the horizontal distance between the upstream and downstream face batters at the crest as 7'-10-5/8" and the downstream face bevel as 7 horizontal to 12 vertical. These are not consistent with the plans as approved by this department, on which plans the former scales as 12 ft. and the latter is given as 7 horizontal to 10 vertical.

Before we can approve of the above changes, we will require your calculations for the stability of the spillway section, showing that the resultant forces comes within the middle third; at least 9-1/4' on the spillway crest as the height of the probable maximum flow, not over 141 pounds per cubic foot for concrete; an uplift of at least 1/4 of the head at the heel and diminishing uniformly to zero at the toe; an ice pressure of at least 10 tons per lin. ft. at one foot below the crest of the spillway, and also a detail of the spillway crest.

Very truly yours,

Deputy State Engineer.

ARMcK/F.

AD-A110 119 STETSON-DALE UTICA NY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. EAST CANADA LAKE DAM (INVENTORY NU--ETC(U)
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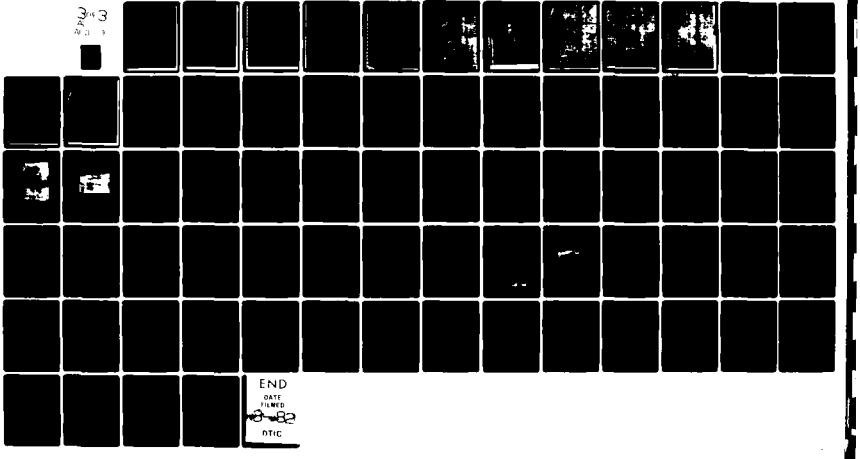

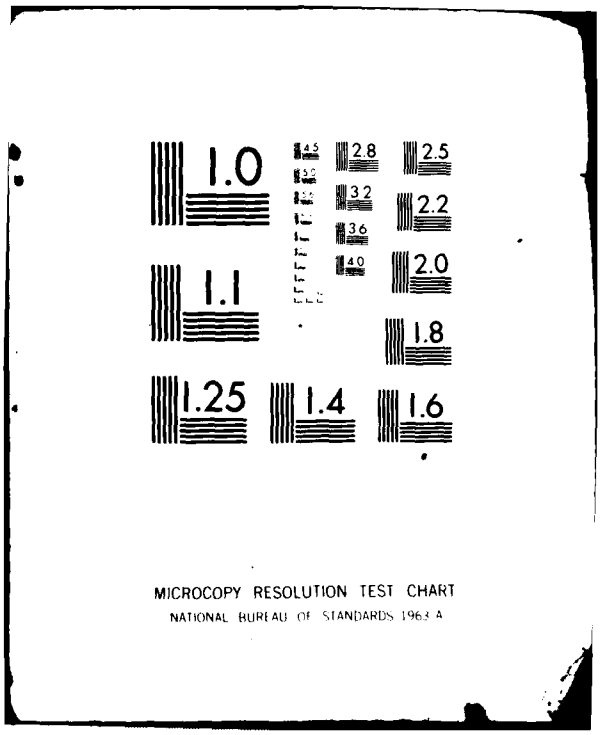
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NATIONAL BUREAU OF STANDARDS 1963 A

ADIRONDACK POWER AND LIGHT CORPORATION

SCHENECTADY . N.Y.
February 26, 1924.

Mr. Arnold D. Chapman,
State Deputy Engineer,
Albany, N. Y.

Dear Sir: Attn: Mr. McKim

I wish to make a preliminary report on the conditions of the Beardslee Falls dam. I had hoped to include in this a record of quantities of material that have thus far been placed. I expect to get this information in a few days and will advise you relative to it at a later time.

Foundations. The foundation that was uncovered proved to be hard rock of a good quality for the entire length of the dam from the intake eastward to Station 90 plus 50, as shown on Viele Blackwell & Buck's Drawing R-7232 and which is on file in your office. Any loose or unsatisfactory rock was removed.

Cut off wall. A concrete cut off wall has been built on the easterly end of the spillway across the river section to approximately station 90 except for a small section of the river which has been temporarily left open for water control purposes.

Timber crib. A timber crib has been started in the river section for water control purposes.

Yours very truly,

L. A. Whitsit.
HYDRAULIC ENGINEER.

LAW.B

HJH

F. O. BLACKWELL

H.W. BUCK

TELEPHONE
HANOVER 2142

VIELÉ, BLACKWELL & BUCK
ENGINEERS
49 WALL STREET NEW YORK

CABLE ADDRESS
HYDROELEC, NEW YORK

June 28th, 1924.

Mr. Arnold L. Chapman,
Deputy State Engineer,
Albany, N. Y.

Subject:- Dam 554, Mohawk, East Creek.

Dear Sir:-

Please refer to your letter of June 21st to the Adirondack Power & Light Corp.

We are enclosing four prints of our drawings R-7312 (revised June 28th), also four prints of A-7540 showing the section of the dam west of the intake, also four prints of B-7326 showing details of the core walls. These drawings supply the missing dimensions referred to in your letter.

The hydraulic core will be built in a continuous operation from the east end of the spillway abutment. The concrete spillway crest is temporarily left at elevation 486. The south embankment is already built and within a few days will be watertight to elevation 490. The timber crib will be completed to elevation485, and 5' of flashboards put on top, by about the middle of July. A trestle with track at elevation 506.5 is almost complete. It is located about the north toe of the puddle core section and from it the north embankment will be built to elevation 487.

The north embankment will then divert the creek over the concrete spillway and this north embankment on the one hand and the south embankment and timber crib on the other hand will provide a pool in which the hydraulic core will be puddled to elevation 495, after which the two embankments will be raised and the dam completed to elevation 506.5.

For your information sections of the dam are located by measurement from transit station 87 which is 5' east of the intake center line. The station numbers shown on R-7312 have no significance as to distances.

The small dyke at Station 575 has been removed.

If this letter expresses our understanding at yesterday's conferences and you are now in a position to approve the

Mr. Arnold L. Chapman, Albany, N. Y. June 28th, 1924.

drawings, will you kindly send one approved set to the Adirondack Power & Light Corp. and one set to this office.

Yours very truly,

VIELE, BLACKWELL & BUCK.

LJB:M By

P 2451 3060 (6-1296)

STATE OF NEW YORK

DEPARTMENT OF Beardslee Falls

State Engineer and Surveyor

ALBANY

Report of a Structure Impounding Water

To assist in carrying out the provisions of Section 22 of the Conservation Law, being Chapter LXV of the Consolidated Laws of New York State, relating to safeguarding life and property and the erection, reconstruction, or maintenance of structures for impounding water, owners of such structures are requested to fill out as completely as possible this report form for each such dam or reservoir owned within the State of New York for which no plans or reports relative thereto are on file in this Department, and to return this report form, together with prints or photographs explanatory thereof to this department.

1. The structure is on East Canada Creek flowing into Mohawk River in the Town of St. Johnsville & Manheim County of Montgomery & Herkimer and is located 6200' upstream from the concrete main highway bridge which is 3 miles west from the village of St. Johnsville.
(Give exact distance and direction from a well-known bridge, dam, village main cross-roads or mouth of a stream)

2. Is any part of the structure built upon or does its pond flood any State lands? No

3. The name and address of the owner is Adirondack Power and Light Corporation, Schenectady, N. Y.

4. The structure is used for power development

5. The material of the right bank, in the direction with the current, is shale bedrock, overlain with clay; at the spillway crest elevation this material has a top slope of ..... inches vertical to a foot horizontal on the center line of the structure, a vertical thickness at this elevation of ..... feet, and the top surface extends for a vertical height of ..... feet above the spillway crest.

6. The material of the left bank is sand and gravel and indications of clay; has a top slope of ..... inches to a foot horizontal, a thickness of ..... feet and a height of ..... feet.

7. The natural material of the bed on which the structure rests is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.) limestone with occasional layers containing a substantial proportion of sandstone.

8. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing, effect of exposure to air and to water, uniformity, etc. Bed material is of hard rock of good quality but the surface is very irregular. There are innumerable pits and knobs and shelves from a few inches deep to several feet deep.

9. If the bed is in layers, are the layers horizontal or inclined? horizontal If inclined what is the direction of the horizontal outcropping relative to the axis of the main structure and the inclination and direction of the layers in a plane perpendicular to the horizontal outcropping?

10. What is the thickness of the layers? closely bedded

11. Are there any porous seams or fissures? No

12. The watershed at the above structure and draining into the pond formed thereby is 292 square miles.

13. The pond area at the spillway crest elevation is 118 acres and the pond impounds 18 250 000 cubic feet of water.

14. The maximum ~~known~~ estimated flow of the stream at the structure was 21 000 cubic feet per second on March 1913 (Date)

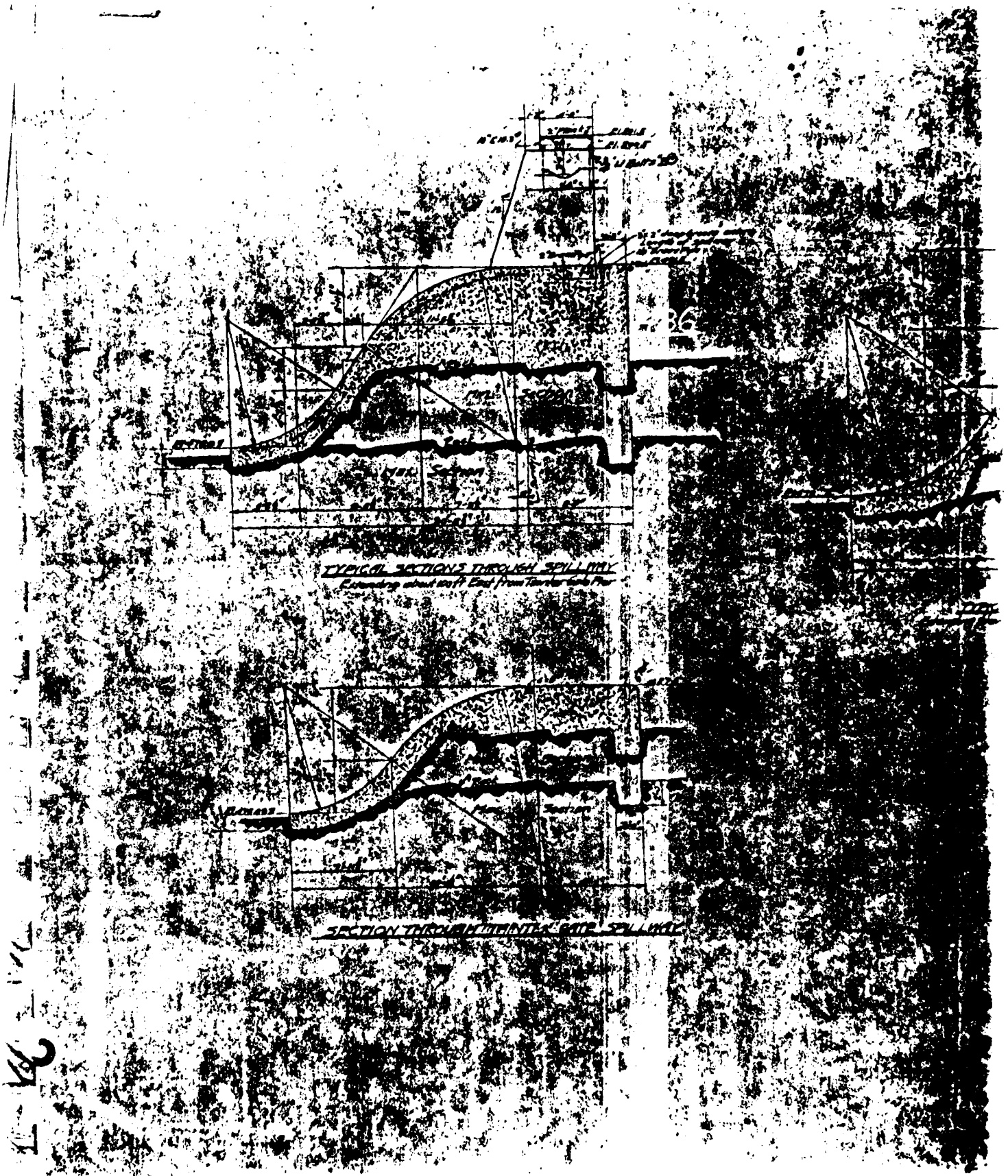
15. Has the spillway capacity ever been exceeded by a high flow? No

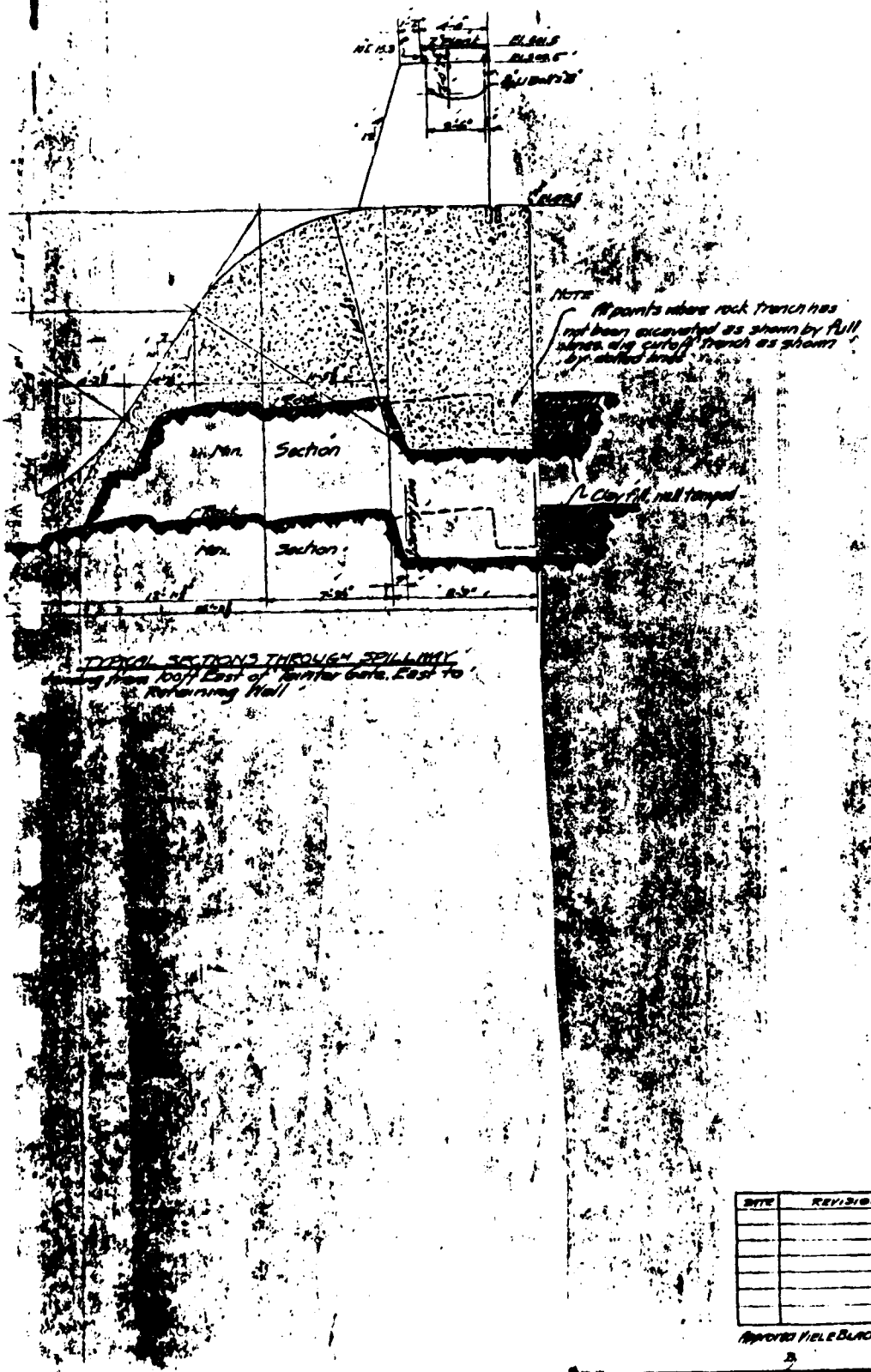
Can any possible flood flow from the pond otherwise than through the wastes noted under 17 and 18 of this report? No If so, give the location, the length and the elevation relative to the spillway crest and the character and slopes of the ground of such possible wastes

16. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the above structure. Describe the location, the character and the use of buildings below the structure which might be damaged by any failure of the structure; of roads adjacent to or crossing the stream below the structure, giving the lowest elevation of the roadway above the stream bed and giving the shape, the height and the width of stream openings; and of any embankments or steep slopes that any flood could pass over. Also indicate the character and use made of the ground below the structure. No serious damage can be foreseen should a failure of the present structure occur. About one half mile below the dam are two bridges one a highway bridge and the other the bridge supporting the N.Y.C.RR tracks. Elevation of the top of the embankment of the highway bridge is 328.2 and of the stream bed 322.50. The elevation of the bottom of the steel beams of the railroad bridge is 327.7 and of the stream bed 313.0. The land below the structure is farm and wood land.

17. WASTES. The spillway of the above structure is 273 feet long in the clear; the waters are held at the right end by a intake section the top of which is 15 feet above the spillway crest, and has a top width of 15 feet; and at the left end by a retaining wall, the top of which is 15 feet above the spillway crest, and has a top width of 10.58 feet.

18. There is also for flood discharge a pipe inches inside diameter and the bottom is feet below the spillway crest; and a (sluice, gate outlet) feet wide in the clear by feet high, and the bottom is feet below the spillway crest.





TYPICAL SECTIONS THROUGH SPILLWAY
Showing from toe of Tainter Gate, East to Retaining Wall

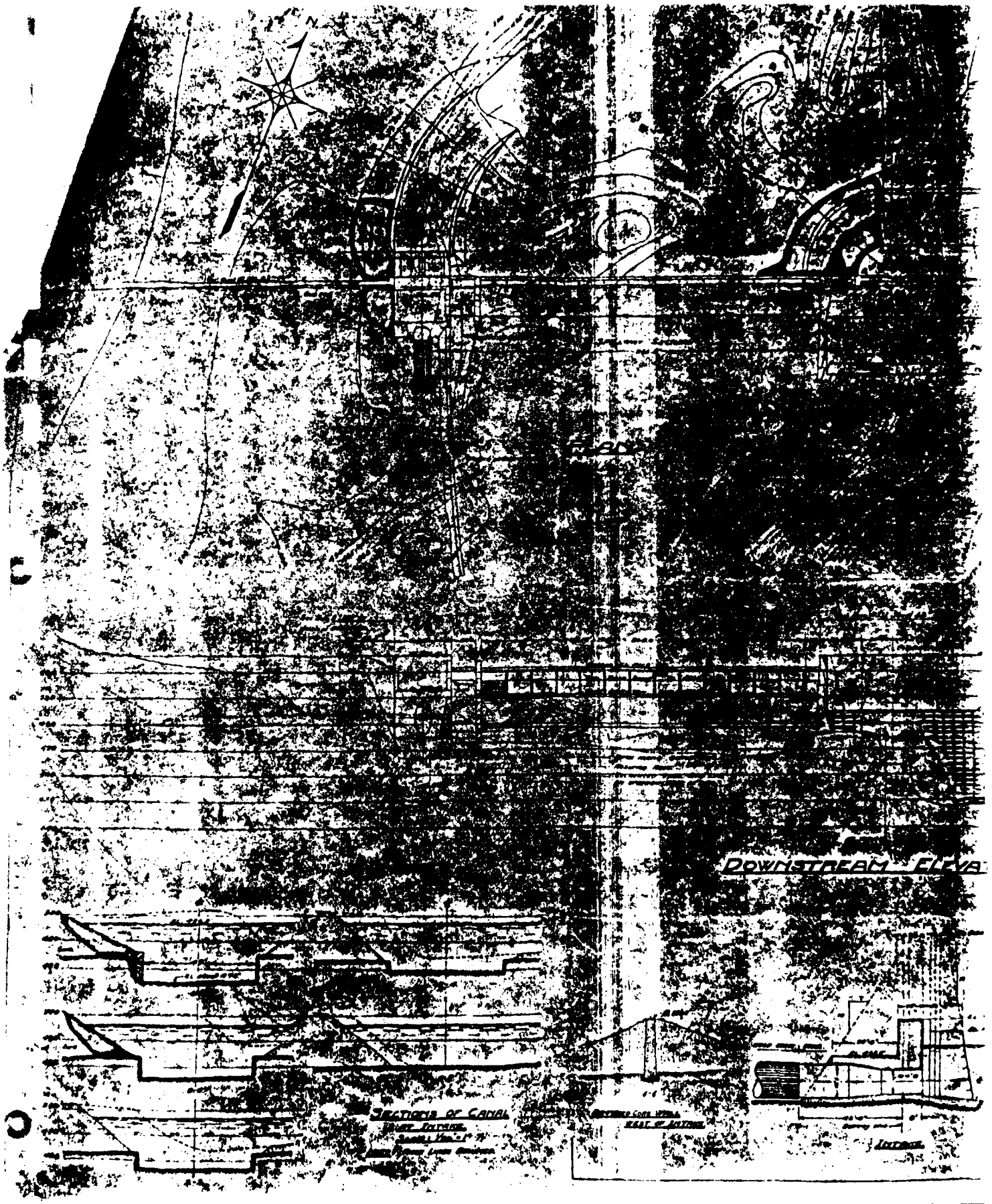
NOTE
At points where rock trench has not been excavated as shown by full lines, dig cut-off trench as shown by dashed lines

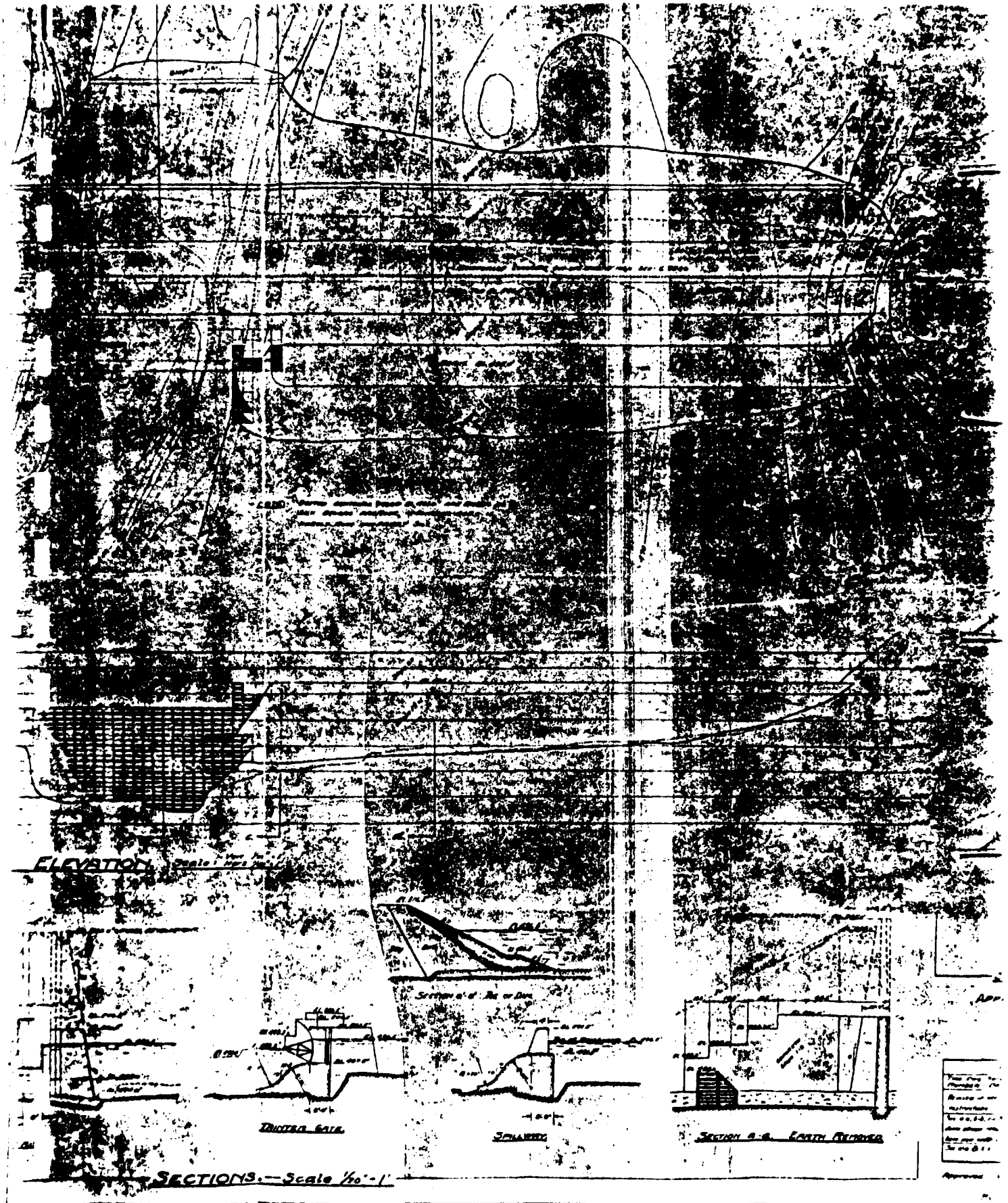
DATE	REVISION

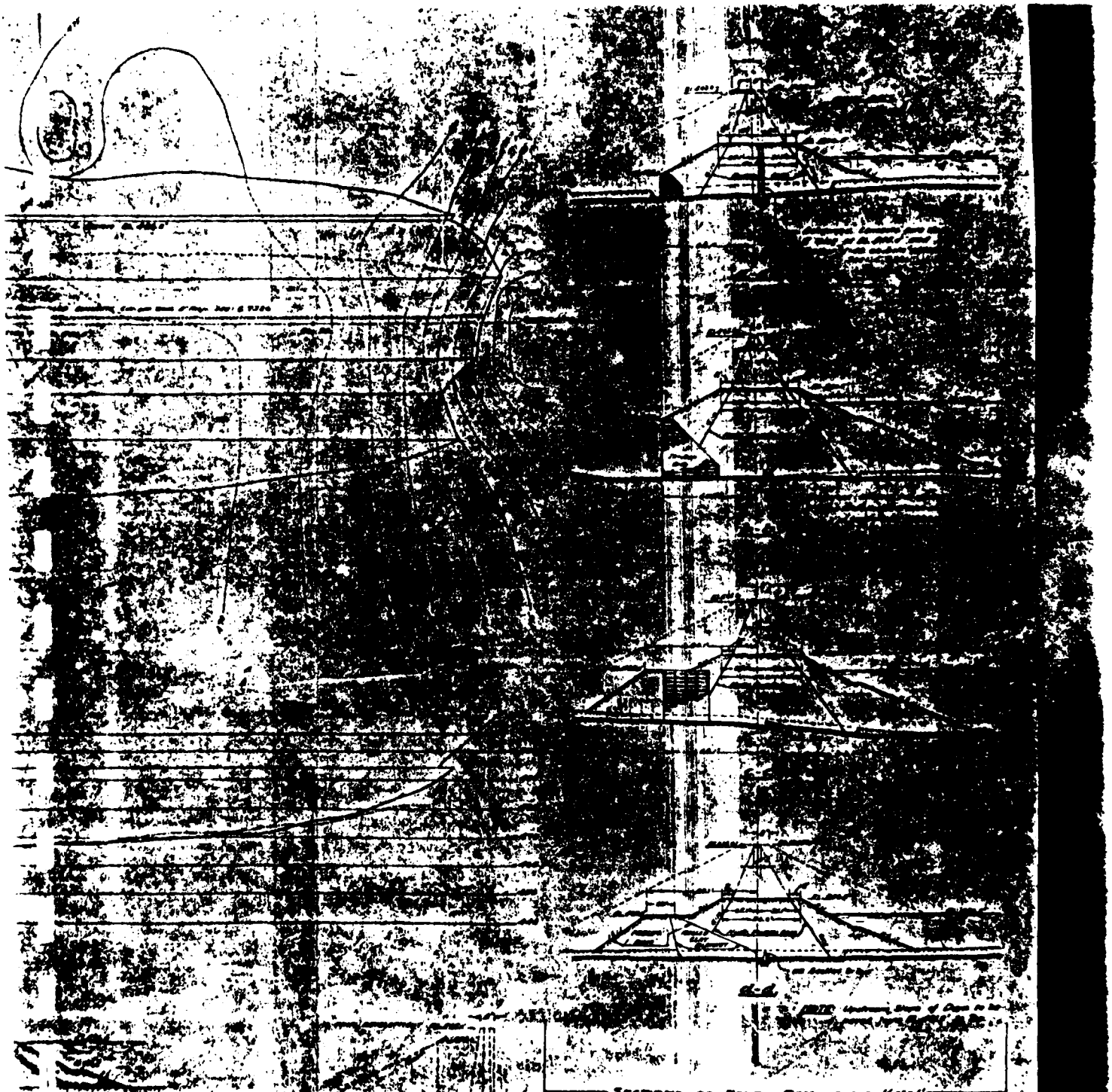
ADIRONDACK POWER & LIGHT CORP.
BEARDSLEE FALLS DEV.
TYPICAL SECTIONS THROUGH SPILLWAY AND TAINTER GATE
MIELE BLACKWELL & BUCK ENGINEERS
AT331
SHEET NO. 3

APPROVED MIELE BLACKWELL & BUCK

APPROVED ADIRONDACK POWER & LIGHT


DOWNSTREAM ELEVA
SECTIONS OF CANAL
RIGHT EMBANK
SECTION CUT VERT
EAST OF ANTENNE
INTERIOR


ELEVATION
Tainter Gate
Spillway
Section A-A Earth Refilled
SECTIONS.—Scale 1/50'-1'



SECTIONS OF EARTH DAM - SCALE 1/16"=1'

APPROVED BY DEPT. OF STATE ENGINEER & SURVEYOR
JULY 1 1924 DAM No 554

Job 83

REVISIONS	ADIRONDACK POWER & LIGHT CORP.
First Proj. Approved (Orig. on file) Provisional - Dated Dec 30 1923	REMSELEER FALLS DEVELOPMENT
Revised in accordance with Chief Eng. Ltr. instructions dated Jan 17 1924	INITIAL STAGE OF DAM WATER EL. 486.5'
Sec. on B.B. on B.B. changed as per Ltr. dated Jan 28 1924	Scale: 1/16" and 1/4"=1' FEB 21st 1924
Sec. on C.C. Connection - Dated June 28 1924	VIELE, BLACKWELL & BUCK. ENGINEERS 49 Wall St. New York
	R7312.

Approved: Viele, Blackwell & Buck Approved: Adirondack Power & Light Corp

SCHEME

SECTION C-C EARTH REMOVED

APRON. Below the spillway there is an apron built of ..... No apron ..... (Material) ....., ...
le and ..... feet thick. The down stream side of the apron has a thickness of ..... feet
dth of ..... feet.

Has the structure any weaknesses which are liable to cause its failure in high flows? ..... No .....

SKETCHES. On the back of this report make a sketch to scale for each different cross-section of the above re at the greatest depth; giving the height and the depth from the surface of the foundation, the bottom width, width (for a concrete or masonry spillway at two feet below the crest), the elevation of the top in reference spillway crest, the length of the section, and the material of which the section is constructed; on the spillway show a cross section of the apron, giving its width, thickness and material, and show the abutment or wash the end of the spillway, giving its heights and thickness. Mark each section with a capital letter. Also a plan; show the above sections by their top lines, giving the mark and the length of each; the openings by orizontal dimensions; the abutments by their top width and top lengths from the upstream face of the spillction; and outline the apron. Also sketch an elevation of each end of the structure with a cross section of nks, giving the depth and width excavated into the banks.

e. WATER SUPPLY. The waters impounded by the above structure have (not) been used for a public water ply since ..... by ..... Never used .....

* At the right end of the main spillway is a 3'-6" wall and immediately adjoining this wall is a 20' Taintor gate section, the spilling crest of which is 4' below the spilling crest of the main spillway.

Flashboard piers and bridge not constructed as yet.

The above information is correct to the best of my knowledge and belief.

Schenectady, New York
(Address of signer)

Adirondack Power & Light Corporation
(Signature)

May 5, 1925
(Date)

General Superintendent
(A person signing for owner should indicate his title or authority)

E. D. HENDRICKS, Division Engineer

STATE OF NEW YORK
DEPARTMENT OF STATE ENGINEER AND SURVEYOR EDH-H
EASTERN DIVISION
158 STATE ST.
ALBANY

RECEIVED
OFFICE STATE ENG.
JUN -1 1925
REFD TO
ANS'D

SUBJECT: Dam 554, Mohawk
East Creek

June 1, 1925

Hon. Roy G. Finch,
State Engineer,
Albany, N. Y.

Dear Sir:-

On May 29th I inspected the dam being constructed by the Adirondack Power & Light Corporation on East Creek just above the old Beardslee Dam.

This structure was inspected by me last year on an average of about once every two weeks and the work was performed in a careful manner and in accordance with the approved plans and my instructions. The dam is now practically completed except the dike and core wall on the west side of the creek. Five-foot flashboards are maintained on the crest of the spillway but the water surface elevation on May 29th was just a little above the crest. The Contractors have made the earth and timber crib dam in the bed of the stream additionally safe by placing rock fill the entire distance across the stream at approximately a 1 on 1 slope and to an elevation somewhat above the top of the timber crib so that the timber crib is entirely covered with rock. The crest of the earth dam has been carried to an elevation about 4-1/2 feet above the top of the abutment or to elevation 511 instead of 506.5 as shown on the plans. This earth dam is composed of rock fill at the upstream toe and is also protected by riprap. There is no indication of any wash. The material in the dam itself is composed of clay, sand and gravel. This material was deposited in the water from trestles and the lumps of clay and material were mixed by means of hydraulic giants.

There are indications in the top of the dam now of some settlement and some cracking of the material as the surface dries out. Last fall there were some indications of seepage in the stream bed immediately below the timber crib dam. The seepage at this point has entirely disappeared. There is, however, at the present time an indication of some slight seepage located about halfway between the east bank of the stream and the east end of the dam. The amount of this seepage is so small that it is not of measurable quantity but it has apparently resulted in a small amount of sloughing on the back of the earth fill 6 or 8 feet above the original ground surface and there are two places in this same locality where the material on the back of the fill appears to be of the nature of quicksand and would not bear my

ght. Owing to the width of the earth fill at this point d the careful manner in which it was constructed I question ether this seepage is coming from the pond above the dam, but hat rather it is due to the water in the hydraulic puddle core being gradually forced out at the point of least resistance.

I will keep this dam under observation in order to determine whether the condition above mentioned becomes more serious or disappears.

The downstream slope of the earth embankment has been carefully graded and well seeded. In every other way this structure is constructed in a satisfactory manner.

Very truly yours,

E W Finch

Division Engineer

DEC 14 1979

File LP 2648.

DIRECTOR, DIVISION OF LICENSED PROJECTS

CHIEF, PROJECT ANALYSIS BRANCH

Navigation Report for the East Canada Creek Project (Beardslee and Inghams Mill plants) FERC No. 2648, on East Canada Creek, New York

Application

Niagara Mohawk Power Corporation filed an application for a major license for the constructed East Canada Creek Project, FERC No. 2648, on June 14, 1967. Revised Exhibits, H, I, L, M and N, and revised opening statements were filed on May 24, 1979. East Canada Creek, Project No. 2648, consists of the Inghams and Beardslee developments. These plants have been in operation since 1912 and 1924, respectively.

Project Description

The East Canada Creek project is located in the townships of Oppenheim, Manheim and Johnsville, in Fulton, Montgomery and Herkimer Counties, in the State of New York.

The following table shows the approximate distance in river miles from the confluence of the East Canada Creek with the Mohawk River, the drainage area in square miles and the installed capacity of the two developments comprising the East Canada Creek project.

Development	River Mile	Drainage Area Square Miles	Installed Capacity
Inghams	4	276	6,400 kW
Beardslee	2	288	20,000 kW
TOTAL			26,400 kW

The Inghams development consists generally of a dam, a 135-acre pond, an intake structure, a steel pipeline, a surge tank, and a powerhouse containing two 3,200 kW units operating under a head of 115 feet.

The Beardslee development consists generally of a dam, a 166-acre pond, a fiberglass pipeline, a surge tank, steel penstock, and a powerhouse containing two 10,000 kW generating units operating under a design head of 155 feet.

Basin Description

East Canada Creek has its source among the mountains in the southwest part of the Hamilton county within a few miles of Piseco Lake. It flows southerly and joins the Mohawk River 6.5 miles below Little Falls, New York, passing across a corner of Fulton county and, then forming the boundary between that county and a part of Montgomery on the east and Herkimer on the west. The East Canada Creek drainage basin contains an area of 299 square miles, and the stream has a length of about 26 miles. East Canada Creek flows through steep banks and a narrow valley. The creek drops 500 feet from river mile 6.5 to the mouth.

Prior Commission Action

There has been no prior action taken by the Commission on East Canada Creek.

Navigability

The reference materials examined by Staff concerning the East Canada Creek and its environs revealed saw, grist, and cider mills located on the creek as early as 1780, however, the references mention only that the mills utilized the water power. Timber was cut near the headwaters of East Canada Creek but the logs were reportedly hauled to the Sacondaga River for transport to the mills at Troy and Albany.

Although the Mohawk River, to which East Canada Creek is tributary, was a major link in the New York State Barge Canal system; the character of East Canada Creek, particularly its lowermost miles made water transport to the canal system impractical.

Research has revealed no indications that East Canada Creek has been used for commercial navigation however the stream is used for white water canoeing and kayaking from its headwaters to its mouth.

Summary and Conclusion

Staff research efforts have not produced any evidence of past use of East Canada Creek for commercial navigation. There are references to document the use of the stream for sport and pleasure boating throughout its length.

The East Canada Creek project is not located on government lands nor are there any government dams located within the East Canada Creek Basin. The project is located on a tributary to a navigable water of the United States. It is interconnected to a system which transmits power across state lines, however, there has been no post-1935 construction. There have been no federal improvements on the river.

Recommendation

It is recommended that Niagara-Mohawk's application for license for Project No. 2648 be dismissed for lack of jurisdiction.

OEPR
Matthews, S.:can
12/12/79

cc: NYRO, Files, OGC, OE (Rm. 3106), PAB, Mr. Matthews

JUN 8 1979

DIRECTOR, DIVISION OF LICENSED PROJECTS

1979 JUN 15 AM 8:39

CHIEF, PROJECT ANALYSIS BRANCH

Update of Safety and Adequacy Report of February 23, 1972, on Constructed East Canada Creek Project No. 2648, New York.

General

On May 24, 1979, Niagara Mohawk Power Corporation filed revised Exhibits L and M and pages to the text of its application for license for the East Canada Creek Project filed June 14, 1967. The revised Exhibit L drawings show the Beardslee penstock changed from a 13-foot diameter woodstave pipe to a 12-foot diameter fiberglass pipe and include surge tank sections which had been omitted from the original drawings.

Exhibit M consists of two pages. The page describing the Beardslee Development has been revised to include the new penstock description.

The only other changes noted are in the drainage areas at Beardslee and Inghams from 281 to 288 and 278 to 276 square miles, respectively.

Conclusions

The changes shown by the revised application do not effect the conclusions set forth in the safety and adequacy report of February 23, 1972. The Exhibit L drawings recommended for approval in the 1972 Safety and Adequacy report are superseded by the revised Exhibit L drawings and the page of Exhibit M related to Beardslee development is superseded by the revised page of Exhibit M filed on May 24, 1979.

Recommendations

The following revised Exhibit L drawings and Exhibit M have been examined and found to generally conform to the Commission's Rules and Regulations and should be included in the license, if issued:

Exhibit L Sheet No.	FERC No. 2648-	Showing	Superseding FERC No. 2648-
		Inghams Development	
1 A	19	General Plan and Profile	5
2 A	20	Plan and Details of Dam	6
3 A	21	Powerhouse Plan and Elevations	7
		Beardslee Development	
1 A	15	General Plan and Profile	8
2 A	16	Plan and Elevation of Dam and Spillway	9
3 A	17	Plan and Details of Intake	10
4 A	18	Powerhouse Plan and Elevations	11

Exhibit M consisting of two typed pages of general descriptions and general specifications of mechanical, electrical and transmission equipment and appurtenances for the Beardslee and Ingham developments filed on May 24, 1979, and June 14, 1967, respectively.

OLPR
Magoulas, J.:can
5/8/79

cc: NYRO, Files, PAB, Ms. Magoulas, Applications

FEDERAL ENERGY REGULATORY COMMISSION
NEW YORK REGIONAL OFFICE
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10007

May 12, 1980

Mr. George Koch
Supervisor Dam Safety Section
NY State Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233

Re: Oak Orchard Creek Project No. 2667-NY and
the East Canada Creek Project No. 2648-NY

Dear Mr. Koch:

We wish to advise you that the applications for license for Projects 2667, Oak Orchard and 2648, East Canada Creek have been dismissed by Commission orders dated March 26, and April 29, 1980. These applications were dismissed for lack of jurisdiction.

The Oak Orchard Project consists of the Glenwood and Waterport developments. Glenwood Dam is 25 feet high, Waterport Dam is 100 feet high and both dams are of earthfilled construction with concrete core walls. The developments are run-of-river operations and have a combined installed capacity of 6,150 kilowatts.

The East Canada Creek Project consists of the Inghams and Beardslee developments. Inghams Dam is of concrete gravity construction and is 33 feet high. Beardslee Dam is of concrete gravity and earth-fill construction and is 65 feet high. Both developments are run-of-river operations and have a combined installed capacity of 26,400 kilowatts.

As the FERC no longer has jurisdiction at these facilities, this matter is referred to your office for appropriate considerations.

Sincerely,

James D. Hebson

James D. Hebson
Regional Engineer

cc: Dir., OEPR

FERC-NYRO
Goggins, C./em
5/12/80

NIAGARA MOHAWK

NIAGARA MOHAWK POWER CORPORATION/300 ERIE BOULEVARD WEST, SYRACUSE, N.Y. 13202/TELEPHONE (315) 474-1511

December 28, 1978

FED. POWER COMMIS.
RECEIVED
JAN - 2 1979
NEW YORK, N. Y.

Mr. James D. Hebson
Regional Engineer
Federal Energy Regulatory Commission
26 Federal Plaza
New York, New York 10007

RE: FERC Project No. 2648-NY
Beardslee and Inghams

Dear Mr. Hebson:

Your letter of December 7, 1978 to Mr. John H. Terry requested revised drawings and other pertinent data regarding rehabilitation work at the Beardslee Development and a schedule for remedial work on the parking lot retaining wall adjacent to the tailrace area. The following addresses this request.

The Engineering Department informs me that, due to the backlog of work in the Construction Services Department, the "As-Built" information pertaining to the rehabilitation at the Beardslee Development will not be available until February of 1979. Therefore, we will not be in a position to supply the desired information to the Federal Energy Regulatory Commission until about March 1, 1979.

The Engineering Department also informs me that they assumed you were referring to the tailrace area at the Inghams Development. This area is presently scheduled for remedial work to be done during the summer or fall of 1979.

If you require any additional information, please contact Mr. Robert Levett in this Corporation's Engineering Department.

Very truly yours,

John W. Keib
Senior System Attorney

RJL:bc

FEDERAL ENERGY REGULATORY COMMISSION
NEW YORK REGIONAL OFFICE
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10007

December 7, 1978

Mr. John H. Terry
Senior Vice President
General Counsel and Secretary
Niagara Mohawk Power Corporation
300 Erie Boulevard, West
Syracuse, New York 13202

Re: FERC Project No. 2648-NY
Beardslee and Inghams

Dear Mr. Terry:

During the inspection of subject project on 17 October 1978, our staff member had noticed the following:

1. The exposed 13 foot diameter woodstave penstock was replaced by a buried 12 foot diameter penstock at the Beardslee development.

2. The concrete on the parking lot retaining wall adjacent to the tailrace area is deteriorating and is in need of repair.

In connection with Item 1 above, you are requested to advise our Washington Office of this major change to the project facilities. Please send revised drawings and other pertinent data to the Secretary, FERC, 825 N. Capitol Street, Washington, D.C. 20426. We would appreciate your forwarding a copy of the foregoing to our office. Concerning Item 2, it is requested that you provide this office with a time frame of accomplishing the remedial work. The above information should be supplied by February 1, 1979.

Your cooperation in regard to the above matter will be appreciated.

Sincerely,

James D. Hebson

James D. Hebson
Regional Engineer

cc: OEPR
FERC-NYRO
Schiele, A./sb
12/11/78

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D. C. 20426
New York Regional Office
26 Federal Plaza
New York, New York 10007

July 12, 1978

2645

Mr. John H. Terry,
Vice President and General Counsel Secretary
Niagara Mohawk Power Corporation
300 Erie Boulevard, West
Syracuse, New York 13202

Re: Emergency Action Plan
Project No. 2645, 2648,
2664, 2667, 2696, 2701,
2706 and 2713-NY

Dear Mr. Terry:

On March 20, 1978, Mr. William W. Lindsay, Director, Office of Electric Power Regulation of the Federal Energy Regulatory Commission, Washington, DC notified all project applicants for licensing of the Commission requirements for an Emergency Action Plan In the Event of Dam Failure. A copy of Mr. Lindsay's letter of March 20, 1978 is attached to this letter.

In the preparation of your project plan you are requested to include the following:

1. A summary of the study used as a basis for determining the area that may be affected by the project dam failure, including criteria and assumptions used.

2. Actions that would be taken to reduce the inflow to the reservoir, if such is possible, by notifying upstream dam operators to limit the outflow.

3. Actions to reduce downstream flows by controlling the outflow from dams located on tributaries to the stream.

4. The development of detailed and documented plans for notifying law enforcement agencies and Federal, State, and local agencies that would alert businesses and residents endangered by a dam failure.

The study requested in Item 1 will determine the extent of the endangered flood areas. Communications with the above agencies should delineate areas of accepted or designated responsibility. The submitted plan should then establish and document the structured procedures for the notification of all businesses and residents in the affected area. Documentation will consist of acknowledgements by Federal, State and Local officials to the effect that their agency understands their responsibility of alerting the public in those areas within their jurisdiction.

5. In the projected utilization of your plan upstream and downstream changes are to be included, the plan is to be maintained current in all respects and our office advised of changes.

Our engineers in the course of their operational inspections will evaluate the plan's availability and principal features. Please include the New York Regional Office telephone number 212-264-3687 to the list of agencies to be notified in your plan. We request your response to Mr. Lindsay's letter of March 20, by August 1, 1978.

If there are questions on the above do not hesitate to write or call.

Sincerely,

James D. Hebson

James D. Hebson
Regional Engineer

Attachment:
As noted

cc: Director, OEPR

FERC-NYRO
Fitzsimmons, J./em
7/12/78

UNITED STATES GOVERNMENT

Memorandum

TO : THE FILES

DATE: January 20, 1977

FROM : RECREATION RESOURCE SPECIALIST, NEW YORK

SUBJECT: Updated report of Niagara Mohawk Corporation's (NMPC) system-wide recreation plan.

Project No. 2648

On October 5-8, the writer in company with Messers. Peter Tucker, Environmental Engineer, NMPC and Ron Homa, Outdoor Recreation Planner, BOR Northeast Region, visited the existing and proposed recreation facilities that are part of Niagara Mohawk's approved system-wide recreation plan. The review covered only a portion of the company's overall proposal, but included most of the projects for which Exhibits 'R' have been received. The tour commenced from Syracuse, NY north to projects located in the St. Lawrence Drainage Basin then south to Albany, NY and projects located in the Hudson River Drainage Basin.

A complete investigation and analysis of all projects that are included in the Company's system-wide plan was done in conjunction with a staff member of the Washington Office in October, 1970. The present review was to familiarize Mr. Homa with the recreational aspects of NMPC projects and at the same time to determine the adequacy of the Exhibit 'R' submittals. For the most part there has been limited revisions or changes to the original recreation concept.

Most of the agencies who had the opportunity to comment on Niagara Mohawk's system-wide plan are generally favorable to the company's recreation proposals. The New York State Division of Fish and Game however, in its assessment of recreational needs, has indicated a need for a public boat access on the Inghams pond (Project No. 2648). Currently, there is a significant amount of boating use on the Inghams pond from abutting cottage owners, although no activity was observed during the time of the visit. In conjunction with the Department's suggestion, the writer and other members of the touring party conducted a limited reconnaisance along the lower pond area, to determine the feasibility of a boat access. Company owned lands are basically confined to the lower reaches of the impoundment. As a result of the survey I found there was limited feasibility for a boat access site due to a prevailing steep shoreline and a densely wooded terrain that severaly hinders suitable access to the water. In order to provide any form of safe access to the water, a footpath or steps would need to be constructed and then it would seem questionable whether canoes and other light craft could be safely carried on such a steep incline. The

potential therefore, may be limited to shoreline fishing use only. Mr. Tucker informed me that the company will plan a further assessment of its properties to determine the extent of other areas of feasibility.

All other facilities and properties that were inspected and reviewed appear adequate in sustaining the recreational needs of their respective areas and conform to the context of their respective Exhibits 'R'.

The attached photographs are included and made part of this report.

Paul G. Gazzara

Paul G. Gazzara

Attachments:
As noted

PWR-NYRO
Gazzara, P./em
1/20/77

cc: Bur Pwr

EAST CANADA CREEK PROJECTS

Unlicensed Beardslee Development-Project No. 2648

1. View of proposed launch ramp site.

2. View of incoming access to launch ramp.

RECREATION PHOTOGRAPHS
NIAGARA MOHAWK POWER CORPORATION

EAST CANADA CREEK PROJECTS

Unlicensed Inghams Development-Project No. 2648

3. View of cottages on right bank of Inghams pond.

NYRO

October 7, 1976

NYRO

RaC AUG 30 1976

HEAD, SECTION OF APPLICATIONS
(THROUGH: CHIEF, DIVISION OF LICENSED PROJECTS)

August 26, 1976

HEAD, SECTION OF ENVIRONMENTAL ANALYSIS

Environmental Evaluation Report on Project No. 2648-New York

Transmitted herewith is our Environmental Evaluation Report and recommendations on the application for a major license filed June 14, 1967, by Niagara Mohawk Power Corporation for its East Canada Creek Project No. 2648 - New York.

Quentin A. Edson

Attachment:
Environmental Evaluation Report

PWR
Feller, R.:sjb
8/26/76

cc: NYRO
OGC
OES
DLP
Files

ENVIRONMENTAL EVALUATION REPORT
PROJECT NO. 2648 - NEW YORK

THE APPLICATION

Approval of the application for license, filed on June 14, 1967, by Niagara Mohawk Power Corporation (Applicant) for its constructed East Canada Creek Project, would license two powerhouses, with a combined capacity of 26,400 kW; two dams; Inghams and Beardslee Reservoirs, 135 and 166 acres respectively; and appurtenant facilities. The Inghams Development was completed in 1912 and the Beardslee Development in 1924.

The project is located on East Canada Creek in the towns of Oppenheim, Fulton County; the town of Johnsville, Montgomery County; and the town of Mamheim, Herkimer County; all in New York State.

The Applicant proposes no construction or modification of power facilities or changes in power operations. The Applicant proposes in Exhibit R, filed as an amendment to the application on December 10, 1975, to construct, or arrange for the construction, within two years of the issuance of any license, a small picnic and boat access area on 13 acres of land at the Beardslee Development. The facilities would provide six picnic tables, two trash barrels, two cooking grills, a boat ramp, and parking for ten cars with trailers. The proposed recreational facilities would cost an estimated $16,000 (1975 dollars). If alternative arrangements are not possible, the Licensee would operate and maintain these facilities.

NATURAL RESOURCES AND ENVIRONMENTAL VALUES

Fish species present in project waters include smallmouth and largemouth bass, yellow perch, chain pickerel, bullheads, bluegill, and other sunfishes.

Land uses around the project are primarily agricultural and residential. The project reservoirs receive considerable recreational use even though there is no formal public recreational development.

AGENCY COMMENTS

By letter filed January 31, 1968, the U.S. Department of the Interior (Interior) recommended that two special license articles be included in any license issued.

These articles would provide for (1) the maintenance of an instantaneous flow of at least 15 cfs and a daily average flow of 20 cfs when limited by inflow or when agreed to by the Licensee, the State of New York, the Federal Water Pollution Control Administration, and the Commission and (2) Licensee modification of project operation or installation of facilities in the interest of maintaining water quality in East Canada Creek as may be necessary following completion and review of water quality studies in the Hudson River Basin. Interior recommended further that the Applicant be required to file an Exhibit R and that Exhibit K not be approved until an adequate recreation plan is received.

The U.S. Army Corps of Engineers raised no environmental issues (letter filed December 7, 1967). The State of New York Water Resources Commission made no adverse comments on the application (letter filed October 6, 1967) and the Montgomery County Department of Planning and Development endorsed the recreation plan for the project (letter filed April 21, 1970).

The Applicant did not reply to agency comments.

DISCUSSION AND CONCLUSIONS

The Commission approved Applicant's Systemwide Recreation Plan, which includes the East Canada Creek Project, by order issued June 9, 1975. Approval of this plan did not absolve the Applicant from filing an Exhibit R for this project, in fact, it required it. Recreational developments proposed in the Exhibit R do not differ from those proposed for this project in the systemwide plan. Federal, State, and local agencies were afforded opportunity to comment on the system-wide plan.

A copy of the Water Quality Certificate was first requested by staff in letters dated August 31, 1972, and August 9, 1973. The Applicant, by letter filed September 13, 1972, stated that it had applied to the New York State Department of Environmental Conservation (DECON) for the certificate. DECON was asked to advise Staff of the status of the Applicant's request for water quality certification of this project, among others, by letter dated March 6, 1974. Neither an answer to this request nor a Water Quality Certificate have been received to date.

The filing of an Exhibit S was not required at the time the application was filed.

The Applicant filed an Exhibit W on July 19, 1976. The Exhibit did not identify any significant environmental effects resulting from project operation.

The National Register of Historic Places has been consulted, through March 16, 1976, and there are no historic sites included or being considered for inclusion within or near the project area.

Staff considers that recreation, fish, wildlife, and other environmental concerns, including those mentioned by Interior, would be adequately provided for by standard L-Form articles.

For the above reasons and the fact that the project has been in existence for 52 years, Staff considers that approval of the application for license would not constitute a major Federal action significantly affecting the quality of the human environment. OES concurred with this conclusion by memorandum dated August 4, 1976.

RECOMMENDATIONS

Staff recommends that Exhibit R for Project 2648, filed December 10, 1975, consisting of five pages of text and one map, titled "Beardslee Development Recreation Plan", Sheet No. 3 (FPC No. 2648-14), be approved, insofar as it describes proposed recreational development at the project, and be included in any licence issued.

Staff recommends further that the Standard L-Form Articles on environmental matters at the project be included in any license issued.

Submitted by: R. Fuller
Botanist

Approved by: Eddie B. Crowe
acting Head, Unit of Recreation and Land Use

UNITED STATES GOVERNMENT

Memorandum

RECEIVED
MAR 2 1972
NEW YORK N. Y.

TO : CHIEF, DIVISION OF LICENSED PROJECTS DATE: 4 5 FEB 1972

FROM : HEAD, SECTION OF PROJECT ANALYSIS

SUBJECT: Safety and Adequacy Report for Inghams and Beardslee Project No. 2648

GENERAL

Niagara Mohawk Power Corporation filed on June 14, 1967, an application for license for its constructed Inghams and Beardslee developments, designated as Project No. 2648 and located on East Canada Creek, tributary to the Hudson River, New York. The Beardslee and Inghams developments have installed capacities of 20,000 kw and 6,400 kw, respectively. Inghams was placed in operation in 1912 and Beardslee in 1924. The project is described in the attached bulletin board notice dated July 5, 1967. The location of the project is shown on the attached map and profile.

Adequacy of Spillway

Inghams

The drainage area at the Inghams development is 278 square miles. The spillway is 205 feet long and 28 feet high with a crest elevation of 657.3 feet and an additional 4.5 feet of flashboards. The spillway capacity at non-overflow El. 665.8 is about 20,000 cfs. The PMP flood for both developments was estimated at 100,000 cfs. Should this flood occur the non-overflow section would be overtopped. The maximum flood of record was 24,000 cfs on October 2, 1945, due to a failure of a dike upstream.

Beardslee

The drainage area at the Beardslee development is approximately 281 square miles. The spillway is a gravity

ogee type structure 273 feet long and 18.5 feet high with an additional 7 feet of flashboards. Abuting the overflow spillway is a gated section 20 feet long and 28 feet high containing of one taintor gate. If the PMP flood of 100,000 cfs should occur, the spillway would be completely inundated. Overtopping of the timber crib dam could cause some unravelling of the structure; however, failure if, any, would not endanger life or property downstream.

The spillways are considered safe and adequate as both dams have been found to be stable under maximum flood conditions.

Safety of Structures

Computer analyses of both dams under eight various loading conditions were made. Beardslee was found to be safe and adequate under all conditions. Inghams was found to be safe under all conditions except under maximum flood conditions assuming full uplift over 100% of the base.

The consultant to the Applicant made field investigations to determine actual uplift conditions present at the site. The findings of the study which were submitted in a report entitled "Report of Stability Analysis Non-Overflow Section Inghams Dam" dated November 1970, found considerably less than 100% uplift. Based on the actual pressures found under the dam, the non-overflow section, which is the most critical, is safe and adequate against sliding and overturning under all conditions.

Adequacy of Project

Both developments are run-of-river plants. Since the ponds are small they have very little regulating effect on the stream flow. The Applicant's critical month is December and during this period they operate five days per week, six hours a day at Inghams and three hours a day

five days per week at Beardslee. On this basis, the dependable capacities of Inghams and Beardslee are 5,200 and 16,000 kw, respectively. The following tabulation compiles generating and hydraulic data for the developments.

	Inghams	Beardslee
Avg. annual generation (MWH)	27,176	47,418
Hydraulic Capacity at best gate (cfs)	598	1,196
Average kw	3,100	5,400
Average Stream Flow (cfs)	635	635

No further development of the site is contemplated by the Applicant. The Planning Status Reports showed no projects proposed which would conflict with the Inghams and Beardslee developments.

Conclusions and Recommendations

It is concluded that the structures covered by the application for license for Project No. 2648 are safe and adequate and the project, under present conditions will be best adapted to the comprehensive development of the Hudson River Basin upon compliance with the special terms and conditions set forth in the appropriate L form.

It is recommended that the following L drawings and Exhibit M which have been examined and found to generally conform to the Commission's Rules and Regulations be included in the license, if issued:

Exhibit	FPC No.	Showing
	Inghams Development	
L-1	2648-5	General Plan and Profile
L-2	2648-6	Plan and Details of Dam
L-3	2648-7	Powerhouse Plan and Elevations
	Beardslee Development	
L-1	2648-8	General Plan and Profile
L-2	2648-9	Plan and Elevation of Dam and Spillway
L-3	2648-10	Plan and Details of Intake
L-4	2648-11	Powerhouse Plan and Elevations

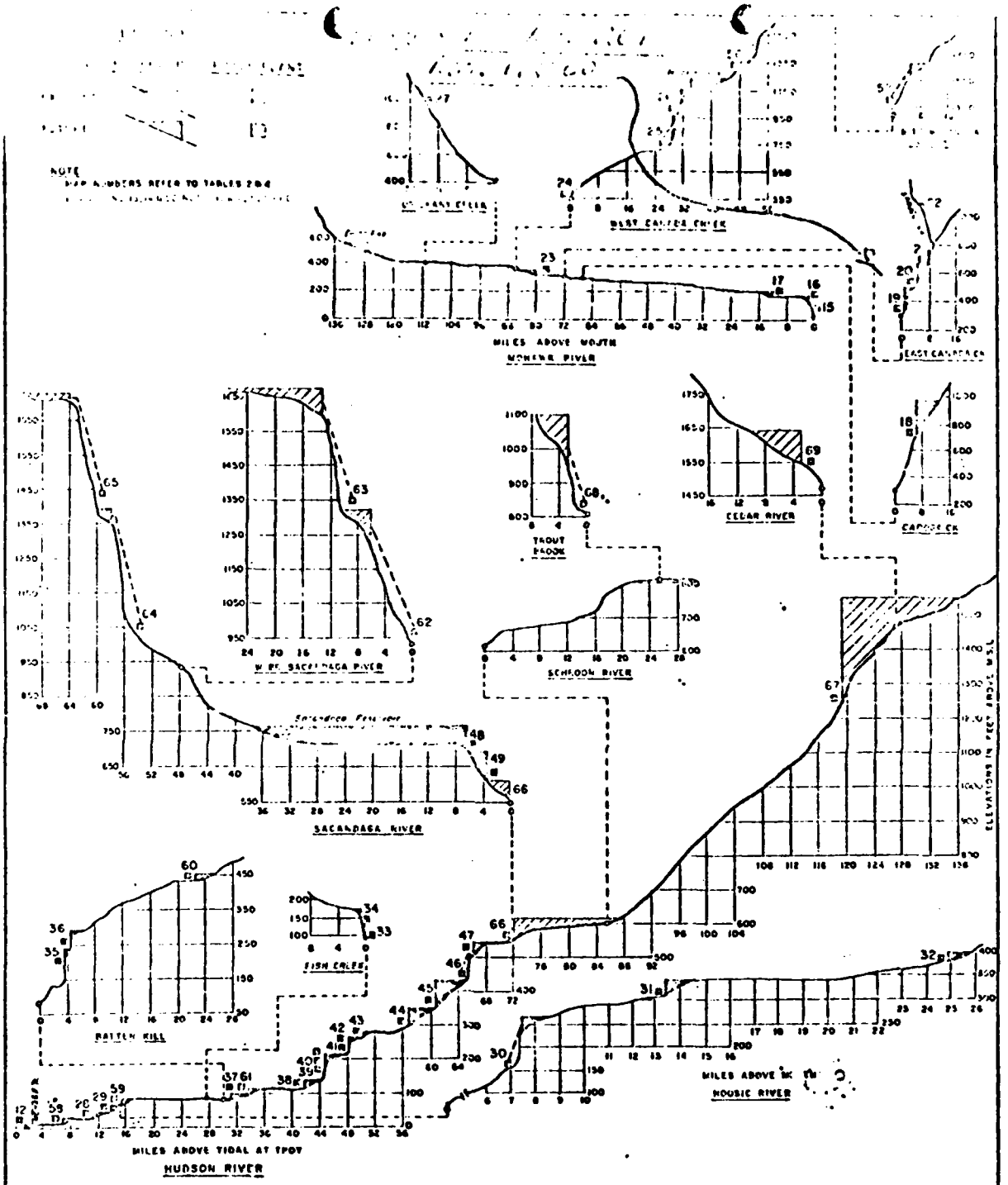
Exhibit M consisting of one page filed as part of the application for license on June 14, 1967.

Attachments:
Bulletin Board Notice
Location Map and Profile

A. G. Sunda

PWR
Hord, C.F.:mpb
February 15, 1972

cc: DLP, NYRO, R. A. Corso, A. G. Sunda, OGC

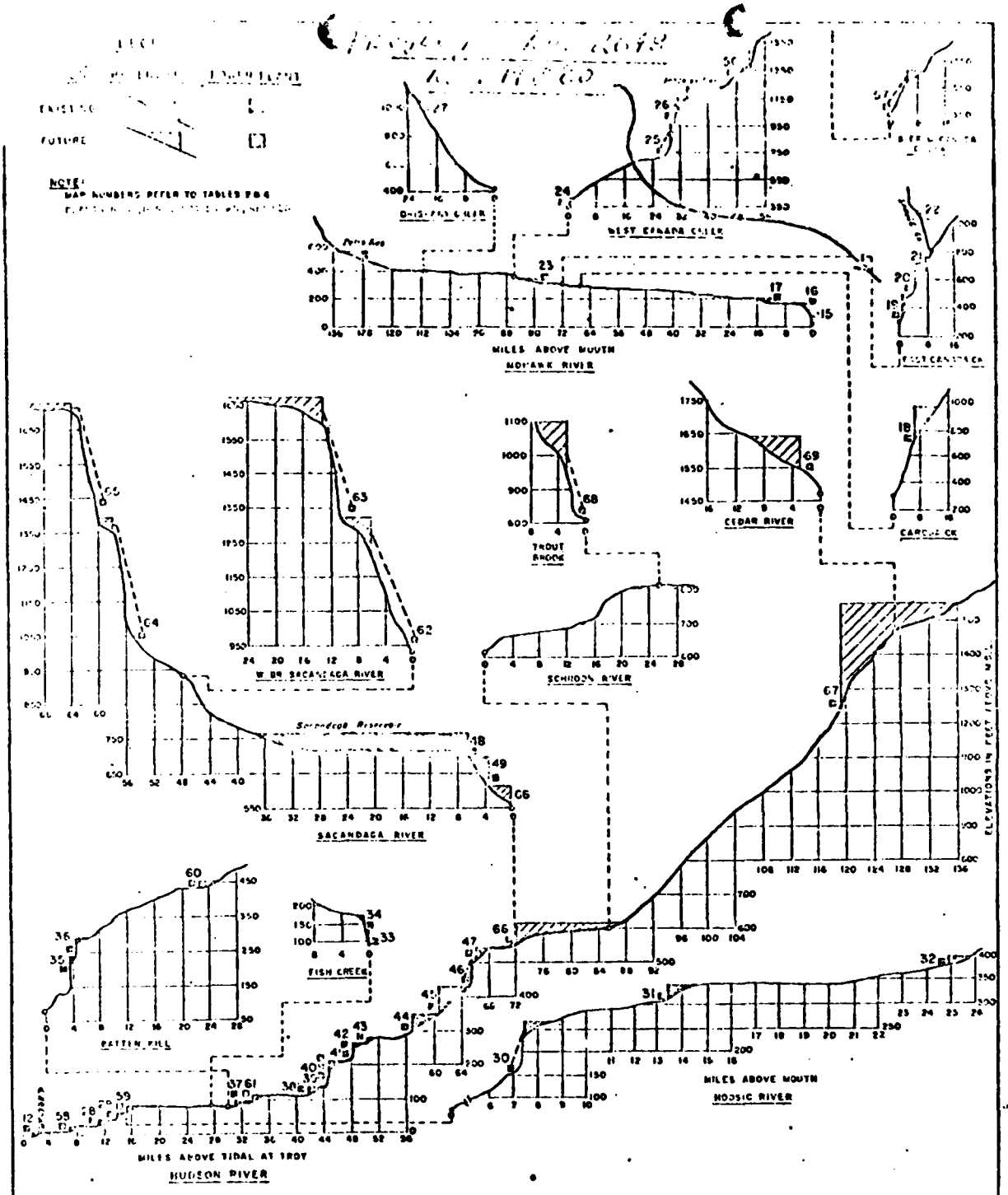


FEDERAL POWER COMMISSION
RESERVOIRS AND POWER DEVELOPMENTS

HUDSON RIVER BASIN

PROFILE—NORTH OF TROY

Figure 2



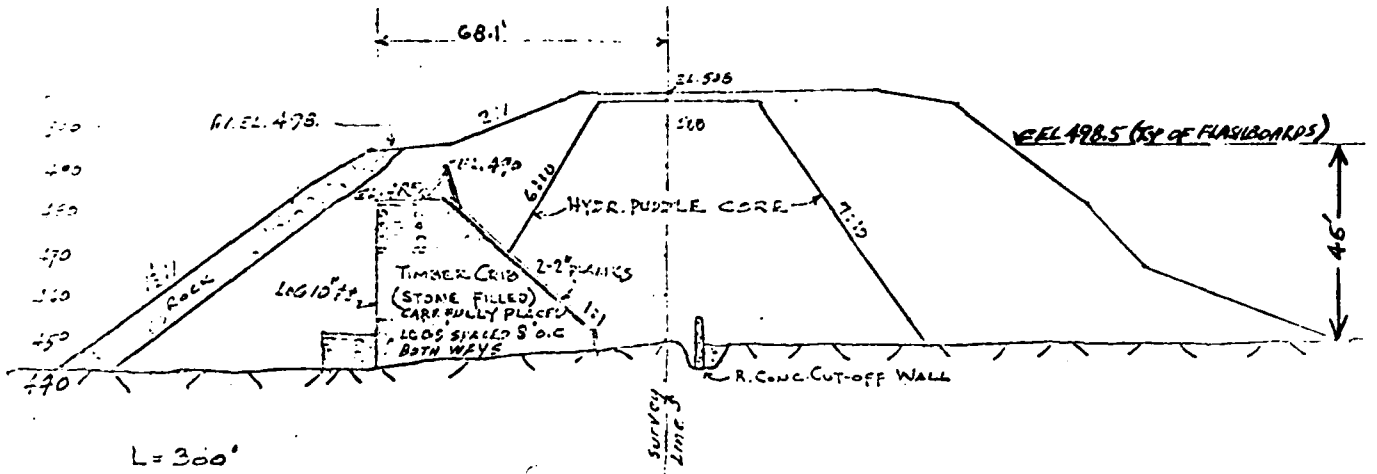
FEDERAL POWER COMMISSION

HUDSON RIVER BASIN

PROFILE—NORTH OF TROY

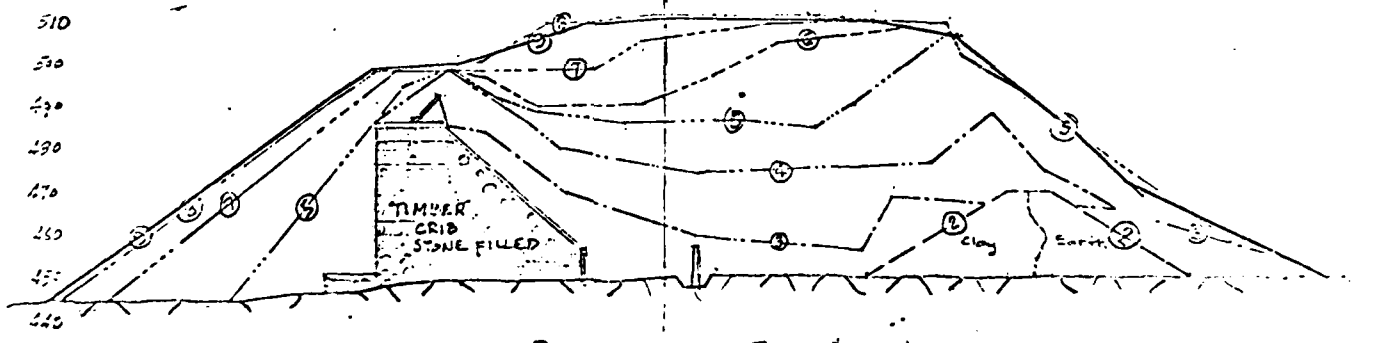
Figure 2

BEARDSLEE HYDRO – EARTH & TIMBER CRIB DAM



MAX. SECTION THRU EARTH & TIMBER DAM (STA 5+00 ±)

SCALE: 1" = 40' (FROM DWG R-7312 SH. 1 & 3)



SECTION STA 5+00 ±

SCALE: 1" = 40'

EARTH FILL CROSS SECTIONS *

(1)	SECTION TAKEN JUNE 1, 1924
(2)	JULY 1, 1924
(3)	AUG. 6, 1924
(4)	AUG. 30, 1924
(5)	OCT. 2, 1924
(6)	NOV. 1, 1924
(7)	DEC 1, 1924
(8)	DEC. 30, 1924
(9)	JUNE 25, 1925 (FINAL)

* DATA FROM DWG A-2481 SHEET #3

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Niagara Mohawk Power Corporation) Project No. 2648

ORDER DISMISSING APPLICATION FOR MAJOR LICENSE

(Issued April 29, 1980)

Niagara Mohawk Power Corporation filed an application for a license for its constructed East Canada Creek Project No. 2648 located on East Canada Creek, a tributary to the Mohawk River, in the Town of Oppenheim in Fulton County, the Town of St. Johnsville in Montgomery County and the Town of Manheim in Herkimer County--all in the State of New York. 1/

DESCRIPTION OF THE PROJECT:

The East Canada Creek Project comprises two run-of-river developments: Inghams and Beardslee. The project consists of two reservoirs with a total surface area of 301 acres, two dams, two penstocks and two powerhouses containing generating units having a total installed capacity of 26,400 kW and appurtenant facilities. All power generated at the project is integrated into the transmission system of the Applicant for ultimate delivery to its customers.

NAVIGABILITY:

Subsection 23(b) of the Federal Power Act (Act) 2/ would require licensing of the East Canada Creek Project if it were located on a "navigable water" of the United States. The Commission's staff has conducted substantial historical research of the navigability of East Canada Creek and has found no evidence yet that the creek is navigable at the site of the project.

Based on the information available at this time, there is insufficient evidence to find that East Canada Creek is navigable within the meaning of §3(8) of the Act. 3/ Further

---

1/ Authority to act on this matter is delegated to the Director, Office of Electric Power Regulation, under Section 375.308 of the Commission's regulations, 18 CFR 375.308, [as amended in Docket No. RM78-19 (August 14, 1978) and in Docket No. RM79-59 (July 23, 1979), and Docket No. RM80-45 (March 28, 1980)].

2/ 16 U.S.C. §817 (1976).

3/ 16 U.S.C. §796(8) (1976).

expenditure of Commission resources on investigating navigability for the project does not appear to be warranted at this time. If new evidence comes to light in the future that shows the river is "navigable" at the project site, §23(b) would, of course, require licensing; and, under §4(g) of the Act, 4/ the project's owner could be ordered to apply for a license.

Post-1935 Construction:

If "post-1935 construction" occurred at a hydroelectric project and the project affected the interests of interstate commerce, §23(b) would require licensing of the project even if it were not located on a navigable water. 5/ Generally, "post-1935 construction" involves work that increases the project's head or its generating or water storage capacity or that otherwise significantly modifies the project's pre-1935 design or operation. 6/

The East Canada Creek project was constructed and placed into operation prior to 1935. The only reported substantial changes since that time have been:

1) generating units at both project developments have been completely overhauled (Inghams Unit No. 1 in 1966, and Beardslee Unit No. 1 in 1964) to effectively extend their operational life beyond that which would have occurred with routine maintenance only, and

2) the 13-foot-diameter and 1800 feet long woodstave pipeline at the Beardslee development was replaced by a 12-foot-diameter fiberglass pipeline in 1978.

4/ 16 U.S.C. §797(g) (1976).

5/ Subsection 23(b) provides that any person intending to construct--after 1935--any project works across any non-navigable stream subject to the constitutional authority of Congress as set forth in the commerce clause must first file a declaration of intention. The Commission then investigates and, if it finds that the project would affect the interests of interstate commerce, the project must be licensed. Farmington River Power Co. v. FPC 455 F.2d 86 (2nd cir. 1972). The kinds of construction that trigger a duty to file a declaration of intention are commonly called "post-1935 construction."

6/ Puget Sound Power & Light Co. v. FPC, 557 F.2d 1311 (9th Cir. 1977).

These changes did not increase the project's head, generating capacity, or water storage capacity, or otherwise significantly modify the project's pre-1935 design or operating regime. For this reason it is concluded that these changes do not constitute post-1935 construction.

Thus, §23(b) does not appear at this time to require licensing of the East Canada Creek Project, 7/ which does not occupy any Federal lands or utilize surplus water power from a Federal dam.

It is ordered that:

(A) Niagara Mohawk Power Corporation's application for a license for the East Canada Creek Project No. 2648 is dismissed for lack of adequate evidence that it is required to be licensed under §23(b) of the Federal Power Act. This dismissal is without prejudice to any future determination, based upon new or additional evidence, that licensing is required.

(B) This order shall become final 30 days from the date of its issuance unless a petition appealing it to the Commission is filed under Section 1.7(d) of the Commission's regulations, 18 CFR 1.7(d) [as amended in Docket No. RM78-19 (August 14, 1978) and Docket No. RM79-59 (July 23, 1979)].

William W. Lindsay
Director, Office of Electric
Power Regulation

7/ Because there has been no "post-1935 construction", the question of whether the project affects interstate commerce need not be addressed. If the project's owner proposed new construction, it would have to file a declaration of intention under §23(b), at which time the project's effects on interstate commerce would be examined.

Project No. 2640

LOCATION East Canada Creek, Herkimer County, N.Y.
Beardslee Falls Development

1. Type of dam, dam foundation - problems since construction.
   Earth fill (920 ft. long, 65 ft. high)

2. Type of powerhouse
   2 @ 10000, 20000 Total

3. Type of intake; penstocks, canal, forebay.
   12 ft. diameter fiberglass pipeline, to steel surge tank, to 13 ft. diameter steel penstock to two 9 ft. diameter penstocks.

4. Crest control, gates, flashboards, etc.
   tainter gate (20 ft. long) and 7 ft. high flashboards

5. Dikes, abutments and adjacent drainage.
   Core wall on right bank, 200 ft. long

6. Reservoir problems.

7. Pertinent inspection licensed articles.

8. Generation abnormalities.

UNITED STATES GOVERNMENT

Memorandum

TO : DIRECTOR, OEPR - ROOM 5100
THRU : REGIONAL ENGINEER, NYRO

DATE: August 27, 1979

FROM : ESTENIO ROSELL AND FRANK P. RICCI
CIVIL ENGINEERS, NEW YORK

SUBJECT: Pre-license Inspection Report - Unlicensed
East Canada Creek, Project No. 2648-NY
East Canada Creek, Niagara Mohawk Power Corporation

The application for a major license was filed on June 14, 1967 by the Niagara Mohawk Power Corporation covering its constructed East Canada Creek Project. Revised Exhibits H, I, L, M and N, and revised opening statements were filed on May 24, 1979. The project is located on the East Canada Creek in Fulton County, Montgomery County and Herkimer County, New York. This report is an update of the initial prelicense report of September 22, 1967, and subsequent reports of January 5, 1975 and October 17, 1978.

The report inspection was made on July 25, 1979 in the company of Messrs. Louis Pratt and Robert Levett representing the Niagara Mohawk Power Corporation.

Project Description

The two constructed developments which made up the East Canada Creek are Inghams and Beardslee are located on the East Canada Creek. The following table shows the township, the approximate distance in river miles from the confluence of the East Canada Creek with the Mohawk River and the drainage area in square miles at each of the two developments.

Development	Town	Distance Miles	Drainage Area Square Miles
Inghams	Oppenheim and Manheim	4	276
Beardslee	Johnsville and Manheim	2	288

The Inghams and Beardslee developments have been in operation since 1912 and 1924 respectively. The breakdown of their installed capacity is as follows:

Development	Installed Capacity
Inghams	6,400 kW
Beardslee	20,000 kW
Total Project	26,400 kW

Inghams - This development consists of a concrete gravity type dam about 400 feet long with a maximum height of 125 feet. It is of concrete gravity construction founded on rock, and consists of a spillway 205 feet long with a crest elevation of 657.3 feet mounted with 4.5 foot high flashboards, a non-overflow section 400 feet long including the intake gates with a top elevation at 665.8 feet and a core wall section 105 feet long extending into the right bank. The area of the pond created by the dam is 135 acres. The pond water passes through an intake structure at the dam, which connects with a steel pipeline 400 feet long and nine feet in diameter. A steel surge tank joints a steel penstock which divides into two 6.5 foot diameter steel penstocks before entering the powerhouse. From the surge tank the water flows through a steel penstock, branching into two hydroelectric units and then into the unlined, excavated tailrace which is about 700 feet long. The powerhouse has a concrete foundation and brick superatructure, and contains two units with a total installed generating capacity of 6,400 kW operating under a head of 115 feet.

Beardslee - This development consists of a earth dam about 920 feet long with a maximum height of 65 feet, and a top elevation of 508 feet. It consists of a headgate house 45 feet long, a tainter gate section about 20 foot long with a crest elevation of 487.5 feet, a spillway section 273 feet long with a crest elevation at 491.5 feet mounted with 7-foot high flashboards. The earthen dam includes a buried timber crib structure in the berm along the downstream side, and a concrete cut-off at its approximate axis. A concrete core wall, about 200 feet long with a top elevation at 506.5 feet, extends into the right bank from the headgate house. Water from the reservoir passes through a fiberglass pipeline about 1,800 feet long and 12 feet in diameter, to a steel surge tank. A steel penstock 60 feet long and 13 feet in diameter runs from the surge tank. This penstock branches into two steel penstocks, 9 feet in diameter and 258 and 291 long. The area of the pond created by the dam is 166 acres. The powerhouse has a concrete foundation and brick superstructure, and contains two identical vertical shaft hydroelectric generating units each rated at 10,000 kW operating under a design head of 155 feet. Water is discharged into a tailrace, 600 feet long, formed by a training wall. At best gate the units utilize a flow of 1,196 cfs.

Operation

These run-of-river developments have usually been operated on a 5 or 6 day use of the 7 day flow. Such operation is dependent upon the average daily stream flow. The section of the Mohawk River into which the East Canada Creek discharge is part of the New York State Erie Canal. Since

the ponds of this project are relatively small, they have very little regulatory effect on stream flow. The plants are normally operated at peak hours for five or six days of a seven day period, ponding water during periods of low demand. The annual peak of the Applicant's system occurs in December and this month, during periods of low runoff, is the critical period for power supply. The 90 percent of time flow for December is, therefore, taken as a measure of the dependable capacity of the developments. The following table shows the December flow for 90% of the time, the number of peaking hours and the dependable capacity in the peak for each of the developments, operating on a five day week basis.

90% Time December Flow - CFS

Development	Daily Basis	Five Day Week Basis	Approx. No. Peak Hours	Power Output
Inghams	125	175	6	5,200
Beardslee	125	175	3	16,000

The powerhouse generated by these developments helps to meet the demands of the industrial, commercial, residential and farm customers of the Niagara Mohawk System.

The Applicant has no plans for further development of East Canada Creek in the immediate future.

Project Investigation

Inghams

The development facilities were inspected on the afternoon hours of July 25, 1979. Temperatures were around 90°F with sunny skies. The approximate amount of time spent at the different portions of the development are as follows: one hour at the powerhouse and pipelines, one hour at the dam, and half hour at the dikes. The powerhouse structure was examined and found to be in good and clean condition, minor cracking was noticeable in the floors. Spalling and erosion of a portion of the parking lot retaining wall adjacent to the tailrace was observed (see Photo 1). This wall was scheduled for remedial work to be done during the fall of 1979. Applicant's representative inform us that the remedial construction work has been postponed, there is no immediate danger at this location due to the fact that the adjacent embankment wall is sloping. At the time of site visit the construction of a new switchyard was underway. Both Units No. 1 and 2, were generating 2,400 kW and 2,600 kW respectively and the water level at the pond was at crest elevation 657.3 feet above m.s.l.

The concrete gravity dam was inspected and found to be in good and stable condition, however, extensive concrete spalling was noticeable along the downstream face of the spillway (see Photo 2).

Niagara Mohawk Power Corporation is aware of the telephone inquiry from N.Y. State Office of Dam Safety concerning Corps of Engineer's recent determination that Inghams Dam was unsafe. Applicant's representative inform us that tensile stresses exists on the heel of the dam under normal operating condition. Copy of NYRO memorandum to Director OEPR dated June 7, 1979 is attached.

We were told that there is some boating use on the Inghams pond from abutting cottage owners although no activity was observed during the time of the site visit (see Photo 3). The Emergency Action Plan in the event of dam failure was not posted. Mr. Levett indicated that the plan is being finalized at the present time and will be posted upon finalization, (Photos No. 4, 5 and 6), illustrated the topography of river banks.

The dam should be classified as a large dam accroding with the Corps of Engineer's criteria. The "Hazard Potential Classification" according to this criteria is 2 (significant), the nearest village downstream is Inghams Mills located two miles downstream.

Beardslee

The development facilities were inspected on the afternoon hours of July 25, 1979. Temperature were around 90°F with sunny skies. The approximate amount of time spent at the different portions of the development are as follows: one hour at the powerhouse and pipeline, and one hour at the dam. The powerhouse was examined and found to be in good and clean condition. The training wall of the tailrace canal has some vertical cracks (see Photo 7). All generating units were motoring due to lack of water even though the water level at the pond was at El. 497.4, about 6.0 feet above crest elevation, and the flashboards were erected. There was a minor loss of water at the tainter gate due to improper sealing of seals (see Photo No. 8). The downstream face of the spillway has spalled concrete along its toe where wire mesh was exposed (see Photo 9), and vertical cracks were also observed along the curved surface (see Photo 10). The condition of the new retaining wall adjacent to the tainter gate was excellent. The upstream and downstream section of the earth embankment located at the left bank had heavy tree growth (see Photo 11). There was no evidence of recreation activity at the pond but some cows were grazing at the right shore upstream of the dam (see Photo 12).

The dam should be classified as intermediate dam according with the Corps of Engineers criteria. The "Hazard Potential Classification", according to this criteria is 2 (significant), the nearest village downstream is the Village of St. Johnsville located five miles downstream.

The Applicant permits the general public to fish and boat on the project waters, but use is minimal. There are no booms, buoys or other restricting devices on the reservoir. Concerning recreational aspects of the project a report entitled "Update Report of Niagara Mohawk Power Corp. (NMPC) System Wide Recreational Plan", dated January 20, 1977, was written by the New York Office Recreation Resources Specialist.

Conclusions

Based on the recent field inspection, review of pertiment data and discussions with the Applicant's representatives, it is concluded that:

1. The existing dams, pipelines, penstocks, machinery and appurtenant structures have been adequately maintained and are in satisfactory state of repair and operating condition.

2. Revised drawings and exhibits that reflect the recren construction or rehabilitation have been filed by the Applicant. (see Applicant's letter to the Commission dated May 17, 1979, copy attached).

3. The project as constructed is compatible with the comprehensive development plan for full utilization of the Upper Hudson River Basin.

Attachments:
Set of 12 Photographs
Location Map
Profile
(3) Photo Location Maps
NYRO memo to OEPR Dated June 7, 1979
Applicant's letter dated May 17, 1979
Statement for operation of flood gates and transmittal letter dated, 8/7/79

FERC-NYRO
Rosell, E.:Ricci, F./em
8/27/79

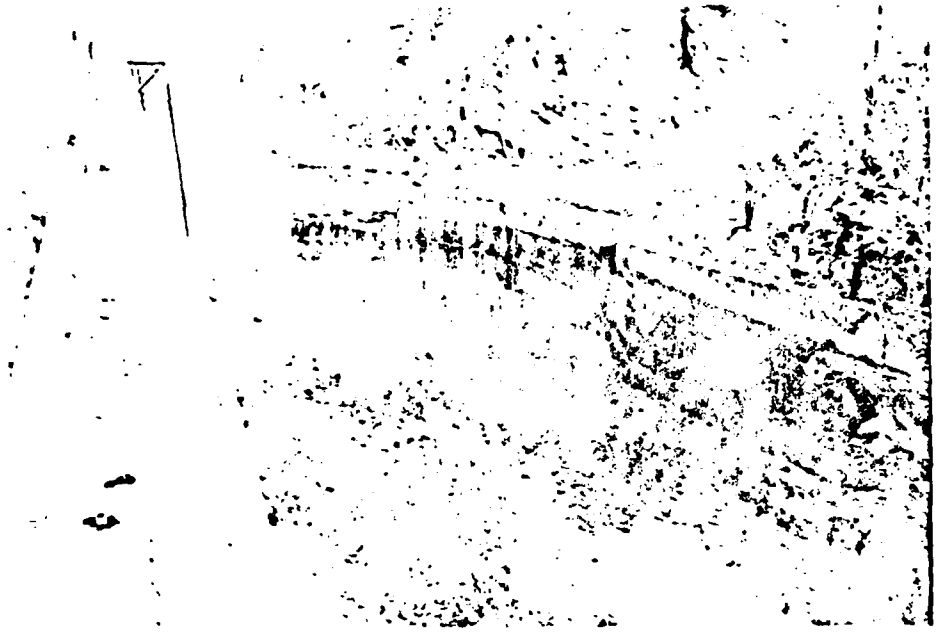


Photo 7 - Beardslee - View of training wall in the area of tail-race downstream of powerhouse.

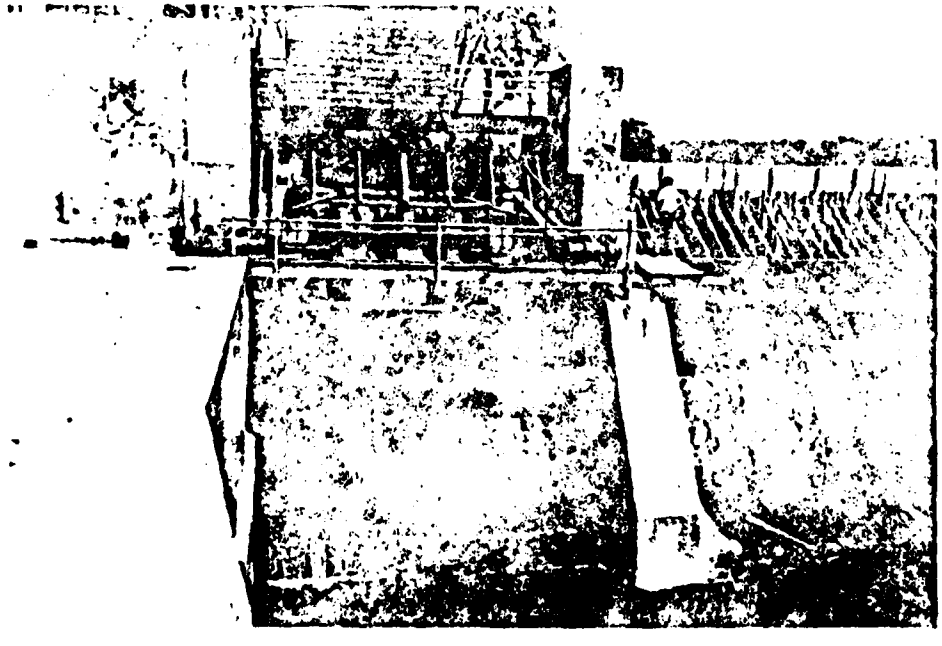


Photo 8 - Beardslee - View of tainter gate, notice minor leakage of water and excellent condition of retaining wall on the right of picture.

PROJECT 2648
LOCATION MAP No. 1

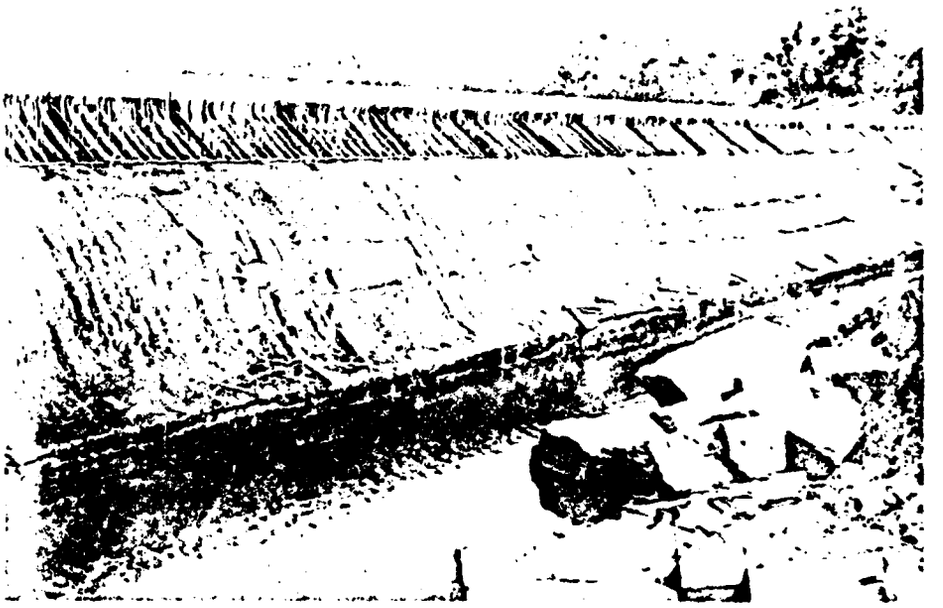


Photo 9 - Beardslee - View of spillway section with flashboards erected. Note poor condition of concrete at toe of dam.

Photo 10 - Beardslee - Another view of the downstream face of spillway with spalled concrete.

Niagara Mohawk Power Co. ration
Unlicensed Project No. 2648
East Canada Creek, NY

Photo 11 - Beardslee - View of reservoir, on the left of picture the earth embankment where heavy tree growth was noticeable.

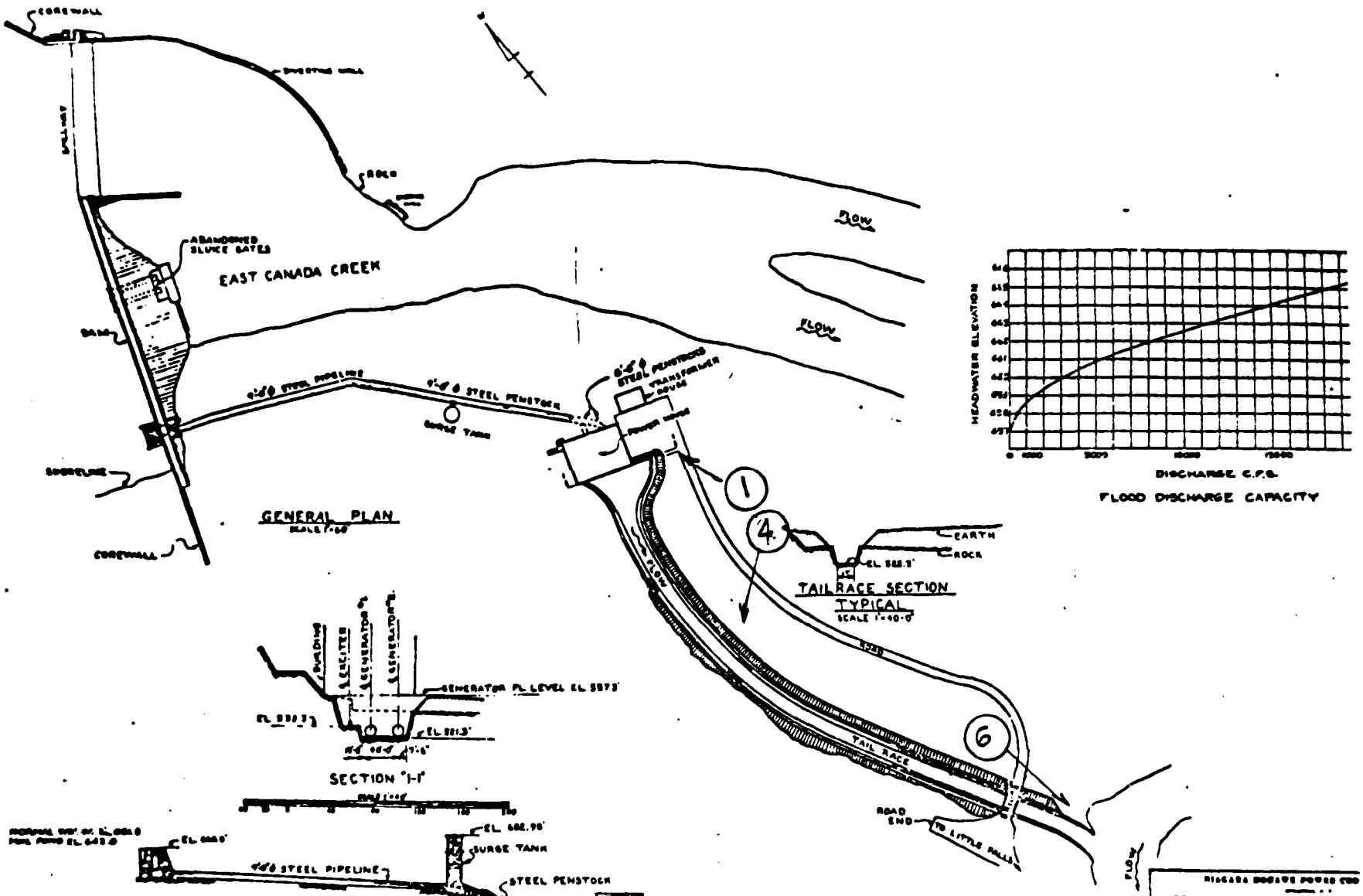
Photo 12 - Beardslee - View of reservoir looking upstream from dam, note cows grazing on the right shore.

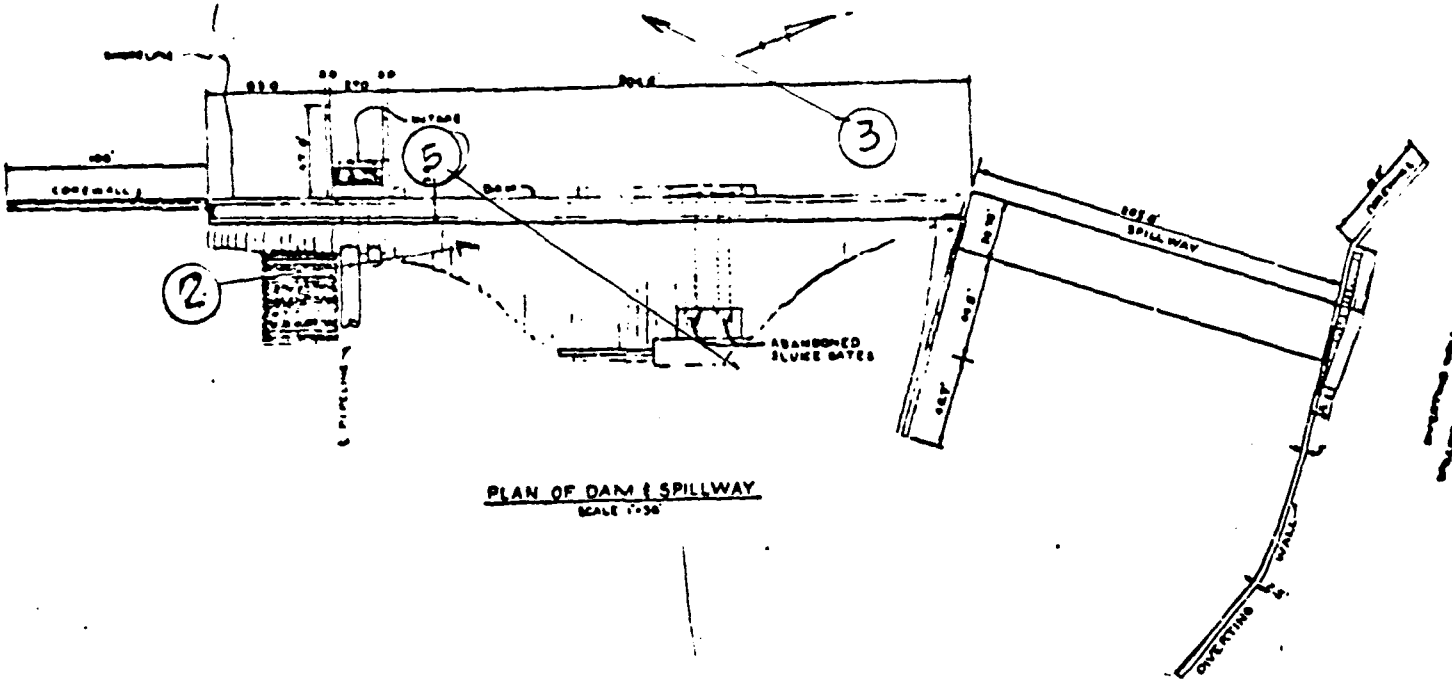
NYSO

July 25, 1979

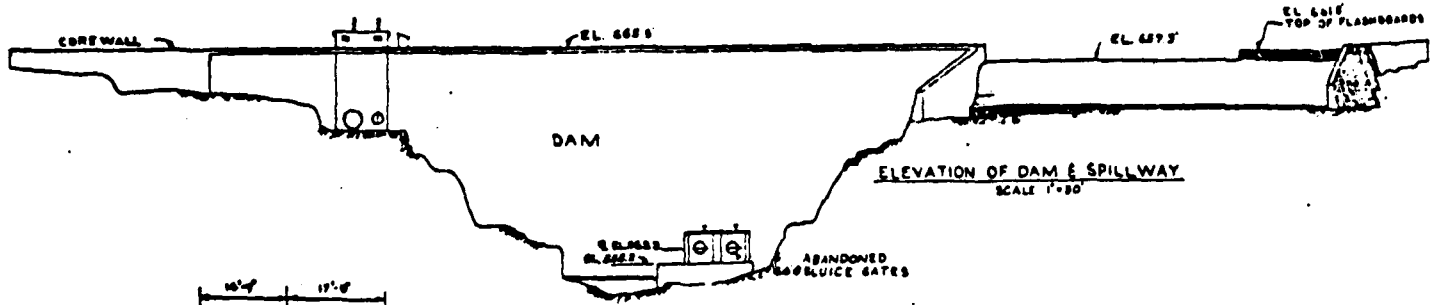
PROJECT 2648
LOCATION MAP No 1

PROFILE OF PIPELINE AND PENSTOCK

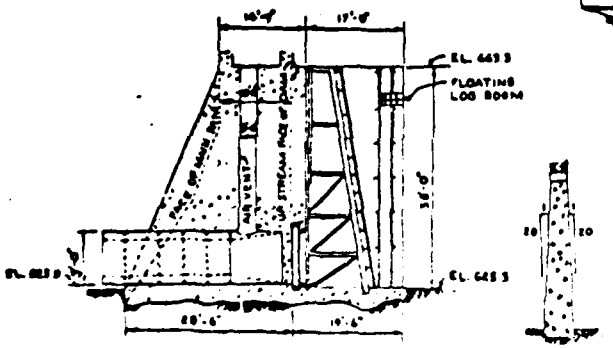

COFFERDAM
SPILLWAY
ROCK
ABANDONED SLUICE GATES
EAST CANADA CREEK
DAM
SHORELINE
COFFERDAM
FLOW
FLOW
GENERAL PLAN
SCALE 1"=60'
HEADWATER ELEVATION
DISCHARGE C.F.S.
FLOOD DISCHARGE CAPACITY
EARTH
ROCK
EL. 588.3'
TAIL RACE SECTION
TYPICAL
SCALE 1"=40'-0"
FLOW
TAIL RACE
ROAD END
TO LITTLE FALLS
FLOW
BUILDING
EXCITER
GENERATOR
GENERATOR
GENERATOR FL. LEVEL EL. 597.5'
EL. 581.3'
SECTION "I-I"
EL. 602.95'
SURGE TANK
STEEL PENSTOCK
POWER HOUSE
EL. 607.95'
NORM T.W. EL. 577.3
PROFILE OF PIPELINE AND PENSTOCK
SCALE 1"=60'-0"
NIAGARA MOHAWK POWER CORP
CONSTRUCTED EAST CANADA CR
IROQUOIS DEVELOPMENT
GENERAL PLAN AND PRO
SHEET 1
PROJECT 2.6



PLAN OF DAM & SPILLWAY
SCALE 1"=50'

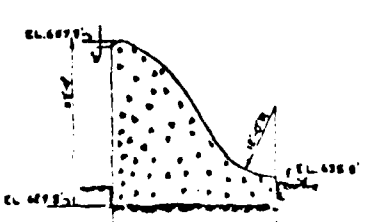


ELEVATION OF DAM & SPILLWAY
SCALE 1"=50'

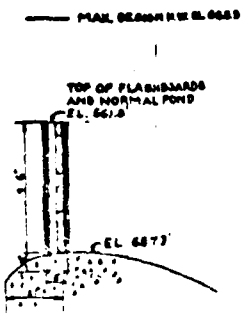


SECTION OF INTAKE
SCALE

SECTION OF COREWALL
SCALE



SECTION OF SPILLWAY
SCALE



SECTION OF FLASHBOARDS
SCALE

PROJECT 2

LOCATION MA

NIAGARA MOHAWK

NIAGARA MOHAWK POWER CORPORATION/300 ERIE BOULEVARD WEST, SYRACUSE, N.Y. 13202/TELEPHONE (315) 474-1511

2645

August 4, 1978

FEDERAL POWER COMMISSION
RECEIVED
AUG - 7 1978
NEW YORK, N. Y.

Mr. James D. Hebson
Regional Engineer
Federal Energy Regulatory Commission
New York Regional Office
26 Federal Plaza
New York, New York 10007

Re: Emergency Action Plans -
Project Nos. 2645, 2648, 2664,
2667, 2696, 2701, 2706 & 2713

Dear Mr. Hebson:

Enclosed please find this corporation's response, dated June 30, 1978, to Mr. Lindsay's letter of March 20, 1978.

As you are aware, this corporation is in the process of preparing Emergency Action Plans and submitting same for all licensed projects. As soon as this work is completed, Niagara Mohawk will embark on a similar program for its pending licenses. A schedule for such submission will be submitted at the time the Emergency Action Plans for the licensed facilities are completed which is scheduled at this time to occur in late Fall of 1978.

I trust the enclosure and this letter constitutes an adequate response to your letter of July 12, 1978. If, however, you have any further questions, please contact the undersigned.

Very truly yours,

John W. Keib
Senior System Attorney

JWK:mml

Emergency Action Plan

SLIP
DATE SENT

NIAGARA MOHAWK

NIAGARA MOHAWK POWER CORPORATION/300 ERIE BOULEVARD WEST, SYRACUSE, N.Y. 13202/TELEPHONE (315) 474-1511

June 30, 1978

FEDERAL POWER COMMISSION
RECEIVED
AUG - 7 1978
NEW YORK, N. Y.

Mr. William W. Lindsay, Director
Office of Electric Power Regulation
Federal Energy Regulatory Commission
825 North Capitol Street, N. E.
Washington, D. C. 20426

Re: OEPR-LP
Project Nos. 2645, 2648, 2664,
2667, 2696, 2701, 2706 & 2713

Dear Mr. Lindsay:

Niagara Mohawk Power Corporation is in the process of preparing Emergency Action Plans for numerous developments including developments which were previously under license. Our schedule has been internally arranged so that emergency plans are now being prepared for all licensed projects on a priority basis, vis-a-vis pending projects. This emphasis was set forth in this corporation's letter to your Mr. J. D. [illegible], New York Regional Engineer, in a letter dated April 24, 1978.

Niagara Mohawk proposes to submit Emergency Action Plans for its pending projects as soon as it has completed the above-mentioned work on its licensed projects. A schedule for such submission will also be submitted for Commission review.

Very truly yours,

John W. Keib
Senior System Attorney

JWK:jml

The Beardslee Development consists of (1) a concrete, rock, and earth-fill dam (top el. 508.0') about 920 feet long and 65 feet high adjoining (2) a spillway section (top el. 491.5') about 276 feet long and 18 feet high topped by (3) flashboards 7 feet high forming (4) a 166-acre reservoir; (5) a gate house; (6) a 13-foot diameter woodstave pipe, about 1,800-feet long; (7) a steel surge tank; (8) a 13-foot diameter steel pipe about 60 feet long which divides into two 9-foot diameter penstocks about 258 feet long and 291 feet long respectively; (9) a powerhouse containing two identical vertical shaft generating units each rated at 10,000 kw driven by two 15,400 hp turbines; (10) a tailrace about 600 feet long; and (11) appurtenant facilities.

Use: Power produced by this project is used by the applicant for public utility purposes.

5. Applicant operates and proposes to operate in the State of New York.

6. A concise general description of the project and the principal project works is as follows:

The constructed East Canada Creek Project is located on East Canada Creek in the town of Oppenheim in Fulton County, the town of St. Johnsville, Montgomery County and the town of Manheim, Herkimer County, New York State. The project consists of two developments. The upstream development is Inghams which is located 4 miles from the confluence of East Canada Creek and the Mohawk River. The downstream development is Beardslee which is located 2 miles from the confluence of East Canada Creek and the Mohawk River. The drainage area at Inghams is 276 square miles and at Beardslee 288 square miles.

(a) Dams and Reservoirs

The Inghams dam is a gravity concrete structure about 400 feet long and 125 feet high. The area of the pond created by the dam is 135 acres.

The Beardslee dam is a gravity, rock, and earth fill dam about 920 feet long and 65 feet high. The area of the pond created by the dam is 166 acres.

(b) Water Conduits

At Inghams water is drawn from the heatwater pond through the intake structure into a steel pipe line about 400 feet long and 9 feet in diameter to a steel surge tank. From the surge tank the water flows through a steel penstock, branching into the two hydroelectric units and then into the unlined, excavated tailrace which is about 700 feet long.

At Beardslee water is drawn from the headwater pond through the

intake structure into a fiberglass pipeline about 1,800 feet long and 12 feet in diameter to a steel surge tank. From the surge tank the water passes into a riveted steel pipe 13 feet in diameter and 60 feet long and then divides into two penstocks each 9 feet in diameter, one of which is 258 feet long and the other 291 feet long and then through the units in the powerhouse to the tailrace.

(c) Powerhouse, Substations and Switchyards

At both Inghams and Beardslee the powerhouses are constructed of brick with a concrete substructure.

There are no substations or switchyards included in the project.

(d) Transmission Lines

There are no transmission lines included in the project.

7. The location of the project applied for is as follows:

(a) In the State of New York

(b) In the Counties of Fulton, Montgomery and Herkimer.

(c) On the following named stream:

East Canada Creek carrying commerce to the following extent: None

8. Lands of the United States which will be affected are located in: None

9. The development of the constructed project is as follows:

At Inghams there are two identical hydroelectric units of 3,200 kw each under a head of 115 feet. The output for the year 1966 was 26,534,000 kilowatthours.

At Beardslee there are two identical hydroelectric units of 10,000 kw each under a head of 155 feet. The output for the year 1966 was 42,990,500 kilowatthours.

10. The electric power developed at this project is integrated

Curve Sheets Nos. 2 and 3 show the estimated tailwater rating curves for Inghams and Beardslee respectively and Curve Sheets Nos. 4 and 5A show the estimated plant capability in kilowatts plotted against station discharge in cfs.

The power generated by these two developments helps to meet the demands of the industrial, commercial, residential and farm customers of the Niagara Mohawk System.

The applicant has no plans for further development of East Canada Creek in the immediate future.

EXHIBIT "I"

Stream flow records, as given in the "U.S.G.S. Water Supply Papers" and the "Surface Water Records of New York," for the gaging stations at Dolgeville and at East Creek were used for the monthly mean flows of East Canada Creek at the two constructed developments. The East Creek, drainage area = 291 square miles, record started in December 1945. Prior to this date, the Dolgeville, drainage area = 261 square miles, record was used. Curve Sheet No. 1A shows the flow duration curve of the monthly mean flow at Inghams and Beardslee Developments for the period from October 1935 through September 1964. For 90% of the time the average daily flow at the two developments is estimated at 125 cfs.

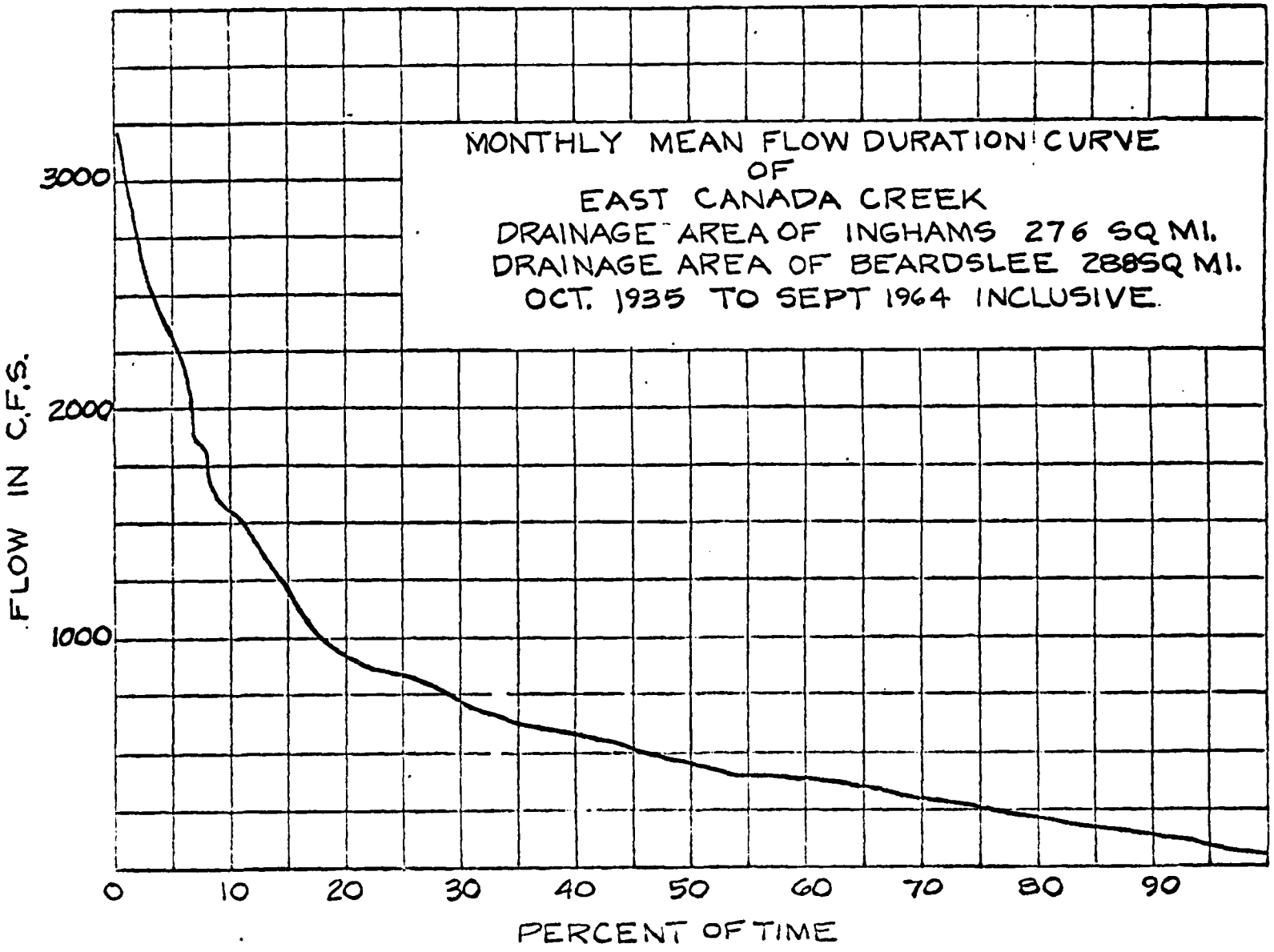
The annual peak load of the Applicant's system occurs in December and this month, during periods of low runoff, is the critical period for power supply. The 90 percent of time flow for December is, therefore, taken as a measure of the dependable capacity of the developments. The following table shows the December flow for 90% of the time, the number of peaking hours and the dependable capacity in the peak for each of the developments, operating on a five day week basis.

90% Time December Flow - CFS

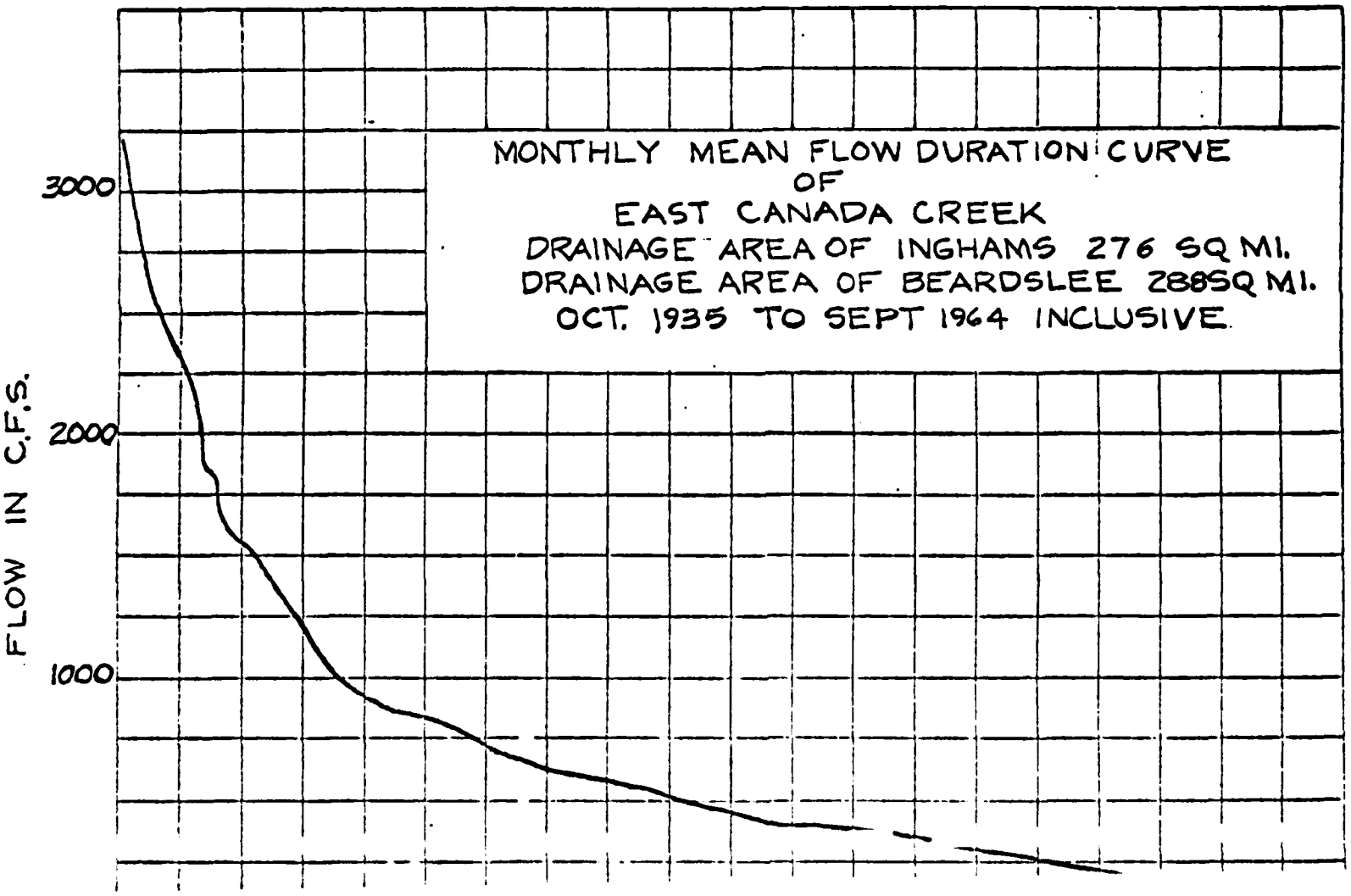
Development	Daily Basis	Five Day Week Basis	Approx. No. Peak Hours	Power Output KW
Inghams	125	175	6	5.2
Beardslee	125	175	3	16.0

The average annual output in megawatt hours based on the period, from 1935 through 1964, is as follows:

Development	Annual Energy MW Hrs.
Inghams	27,176
Beardslee	47,418



CURVE SHEET NO. 1A


MONTHLY MEAN FLOW DURATION CURVE
OF
EAST CANADA CREEK
DRAINAGE AREA OF INGHAMS 276 SQ MI.
DRAINAGE AREA OF BEARDSLEE 288SQ MI.
OCT. 1935 TO SEPT 1964 INCLUSIVE.
FLOW IN C.F.S.
3000
2000
1000

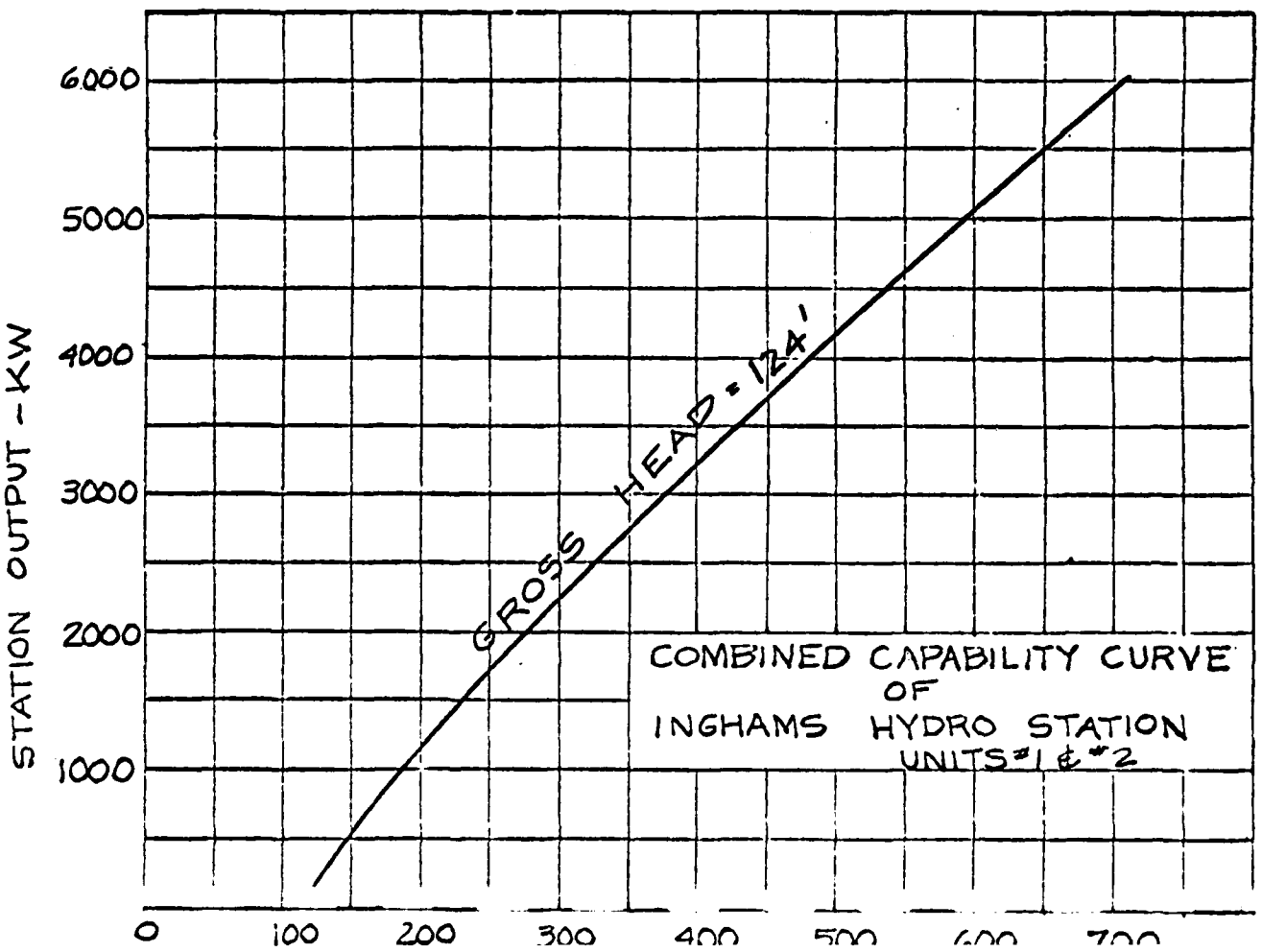

STATION OUTPUT - KW
6000
5000
4000
3000
2000
1000
0
100
200
300
400
500
600
700
GROSS HEAD = 124'
COMBINED CAPABILITY CURVE
OF
INGHAMS HYDRO STATION
UNITS #1 & #2

EXHIBIT "M"

BEARDSLEE DEVELOPMENT

The Beardslee powerhouse contains two identical vertical shaft el tric generating units. Each turbine has a Francis type runner a design capacity of 15,400 HP at a design head of 155 feet and at ga the two units utilize approximately 1,196 cfs.

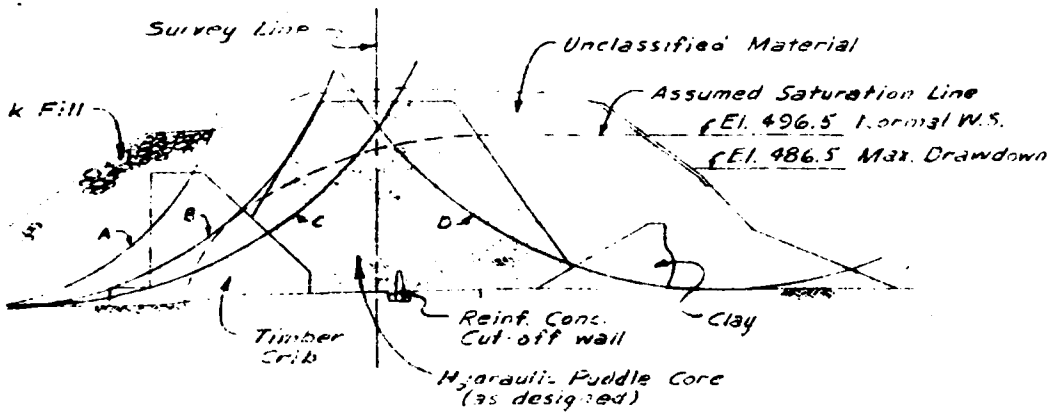
The governing equipment consists of motor driven governors with e servo motors, automatic devices and oil pressure from motor driven ul pumps.

Each turbine drives a synchronous generator equipped with self er There is also a motor driven exciter. The generators are rated ,5^^ KVA, 10,000 KW, 0.8 power factor, 300 RPM, 6,600 volts, 3 phase, cle.

Water is supplied to each unit by a steel penstock 9 feet in ter extending from the surge tank. The manifold at the surge tank d om a 12'-0" diameter fiberglass pipeline that receives water th forebay. There are trash racks located at the pipeline intake.

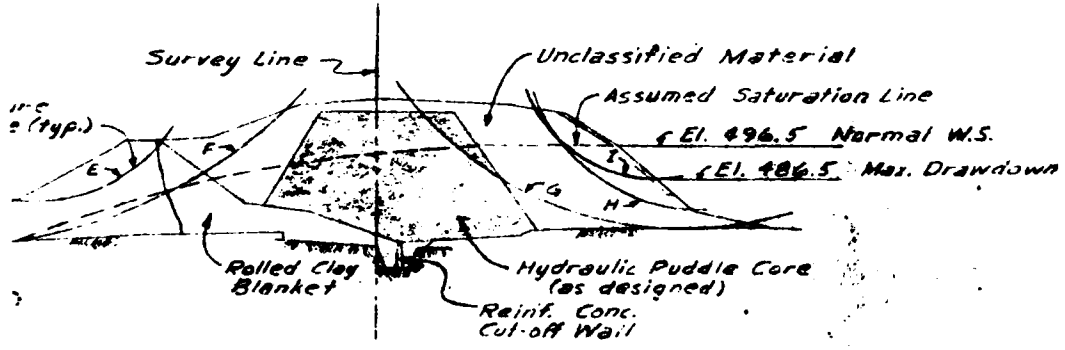
A traveling crane of 45 ton capacity serves the generating

Reference is made to Drawing G-9533-E which is part of this ca.ion. Shown on this drawing and indicated as "PROJECT" are the ho se and switchyard facilities for which application for license ide.



SECTION @ STA. 87+500
MAX. CRIB SECTION
SCALE: 1" = 40'

FACTORS OF SAFETY			
Failure Circle	CONDITION I Steady Seepage min. req'd. 1.5	CONDITION II Sudden Drawdown min. req'd. 1.2	CONDITION III Earthquake min. req'd. 1.0
A	1.55	–	with I 1.37
B	1.81	–	–
C	1.64	–	–
D	1.71	1.48	with II 1.31
E	3.20	–	–
F	2.23	–	–
G	1.88	1.54	with II 1.36
H	2.39	1.74	" 1.59
I	2.68	2.18	" 1.97

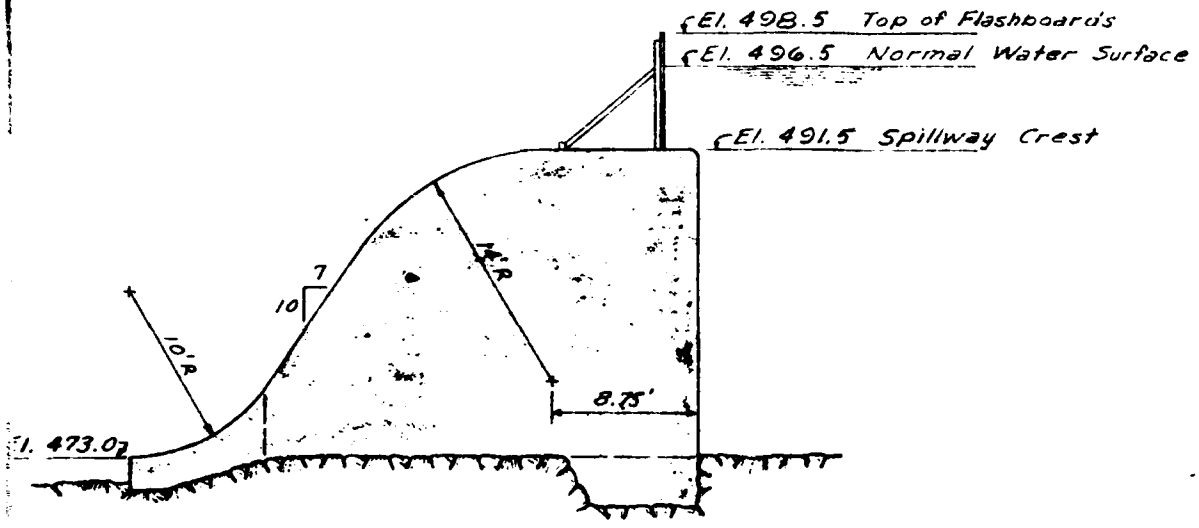


SECTION @ STA. 87+700
MAX. NON-CRIB SECTION
SCALE: 1" = 40'

NOTES :-

1. Factors of safety were computed by means of the Infinitesimal Slice Method.
2. Values used were as follows:
   Unclassified Materials, Clay, and Core
   Moist Weight 112.5 #/c.f.
   Buoyant Weight 62.5 #/c.f.
   Saturated Weight 137.5 #/c.f
   ϕ = 25°
   Cohesion = 500 #/s.f.
   Rock, Dumped and In Crib
   Weights as for Unclassified Materials
   ϕ = 38°
   Cohesion = 0
3. Uplift computed as 62.5 #/c.f. on the saturated area deducted from the Normal Forces.
4. Earthquake acceleration computed as 0.05 g.

NIAGARA MOHAWK POWER CORP.
BEARDSLEE DEVELOPMENT
– EMBANKMENT –
STABILITY ANALYSIS
UHL, HALL & RICH, ENGRS. BOSTON-MASS.
DATE: SEPT. 67 DWG. NO. SK 3667-B



SECTION @ SPILLWAY
SCALE: 1" = 8'

GENERAL NOTES

1. Weight of concrete - 150 #/cu.ft.
2. Weight of water - 62.5 #/cu.ft.
3. Uplift is assumed effective over two thirds of the base area with an intensity varying uniformly from headwater to tailwa
4. Earthquake acceleration is assumed equal to 0.05 g.
5. The shear-friction factor of safety (Ss-f) is computed from the relationsh

$$S_{s-f} = \frac{f \Sigma (V) + r S_a A}{\Sigma (H)}$$

Where 'Sa', the unit shearing strength the material, is assumed to be 380 p.s.i. "A" is the area of the joint; and "r", the ratio of average to maximum shearing stress on the joint, is assumed to be 0.5, "f" is the coefficient of friction considered to be 0.5

STABILITY SUMMARY

Case	Elev	Σ V Kips	Σ H Kips	Σ H / Σ V	S_{s-f}	Resultant from toe	Σ MR Ft K	Σ Mo Ft K	Σ MR / Σ Mo	Conc. Stress p.s.i. Heel	Toe
Full Res. Uplift	473.0	46.5	20.3	.44	36.1	10.3'	891.7	412.0	2.16	4.7	20.2
Same as above with E.Q.	473.0	43.5	24.5	.56	30.0	9.1'	891.7	494.1	1.80	1.2	22.1

NIAGARA MOHAWK POWER COR.
BEARDSLEE DEVELOPMENT
- SPILLWAY -
STABILITY ANALYSIS
UHL, HALL & RICH, ENGRS. BOSTON-MA
DATE: SEPT. 67 DWG. NO. SK 9667-A

APPENDIX G

DRAWINGS

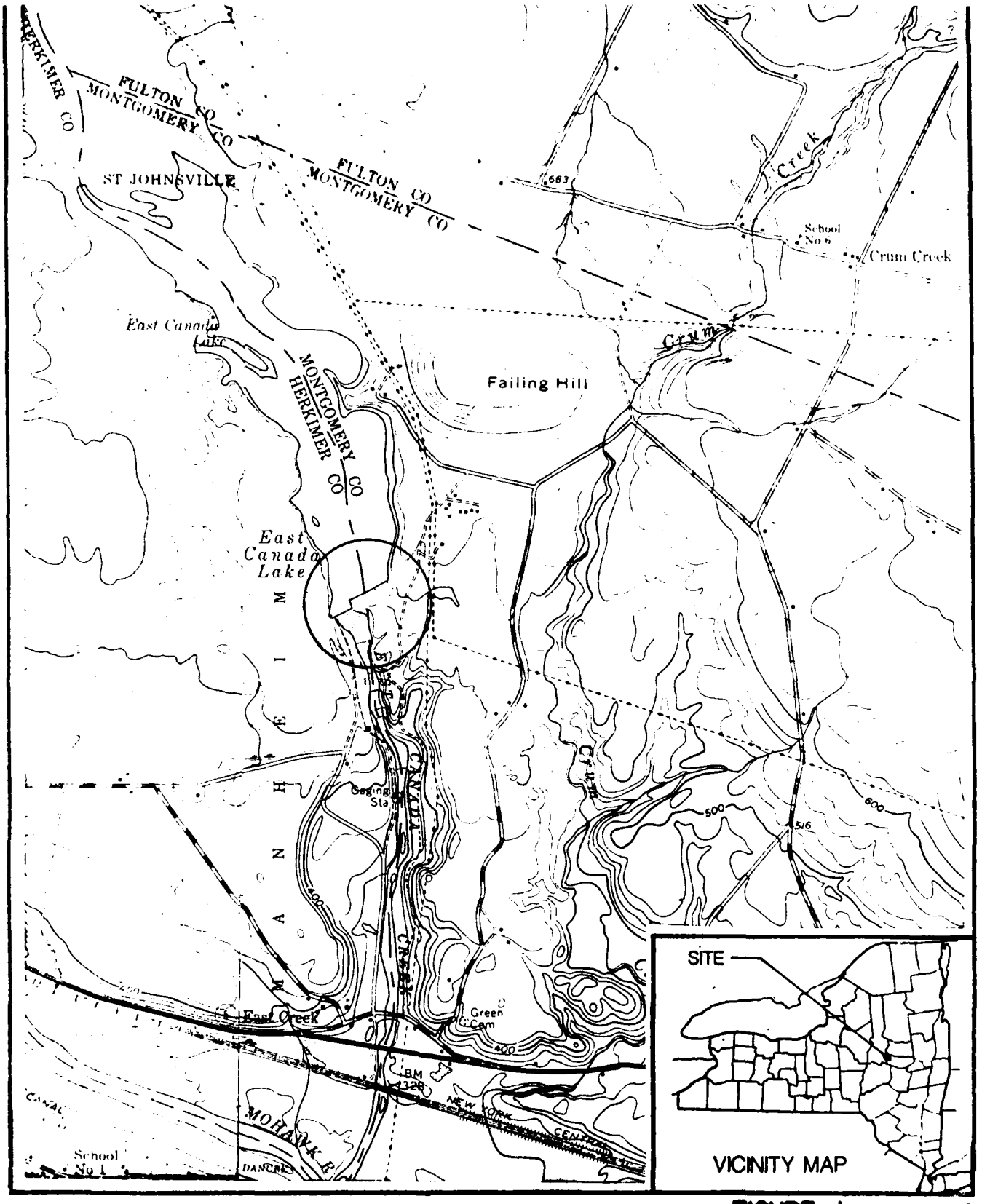


FIGURE 1

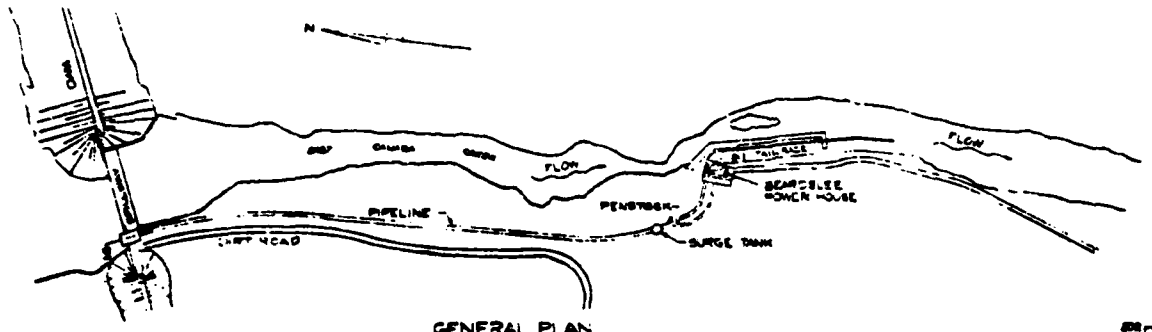
PROJECT BOUNDARY

LOCATION PLAN

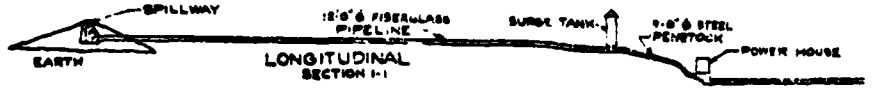
SCALE

1000 0 1000 2000 3000 4000

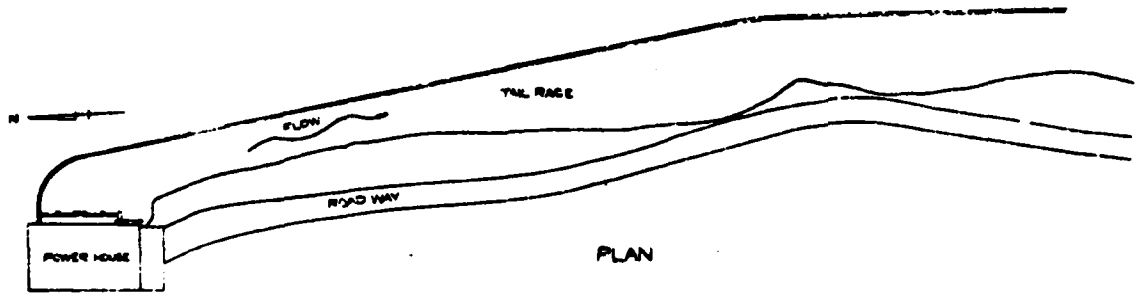
N



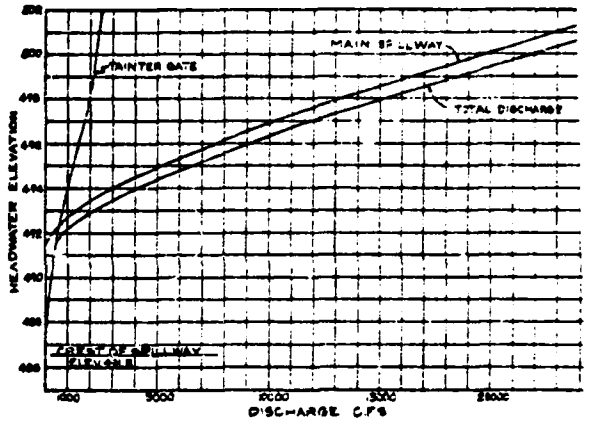
GENERAL PLAN
SCALE 1-200'



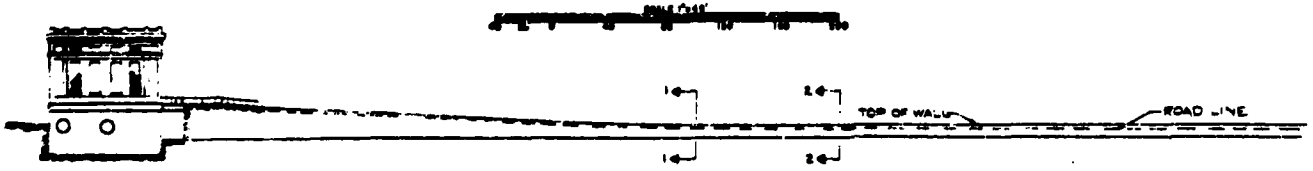
LONGITUDINAL
SECTION I-I



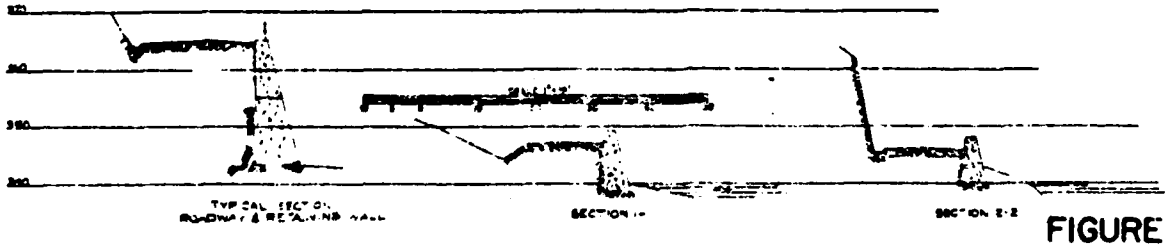
PLAN



FLOOD DISCHARGE CAPACITY



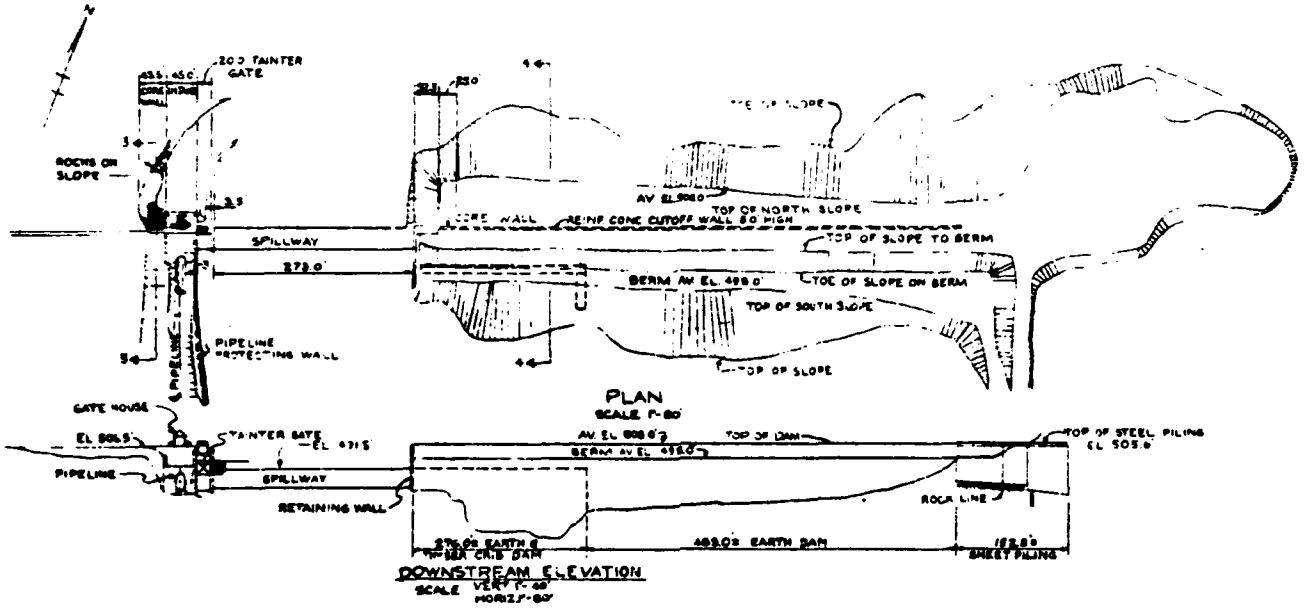
WEST ELEVATION

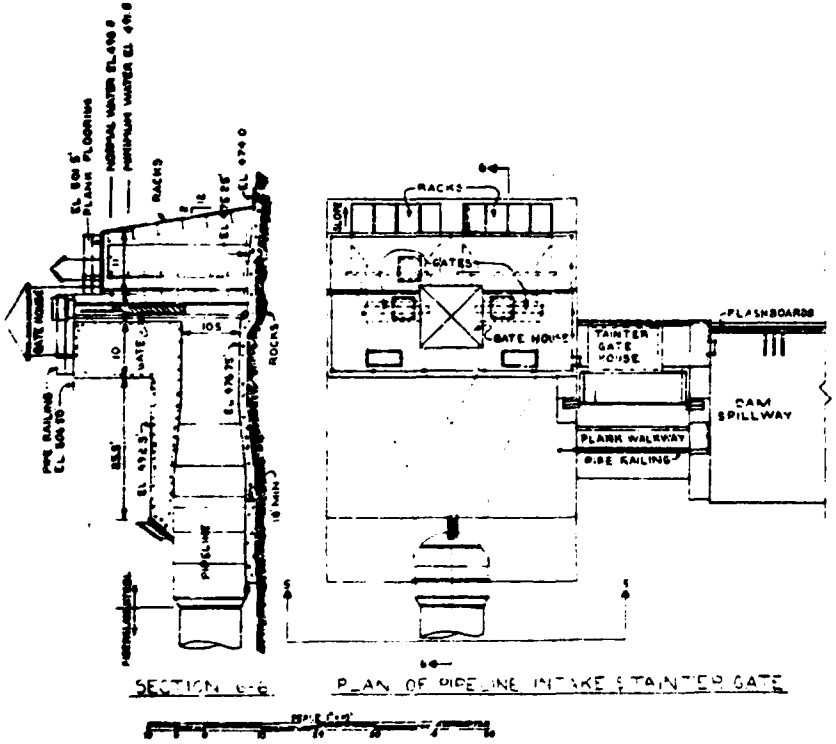


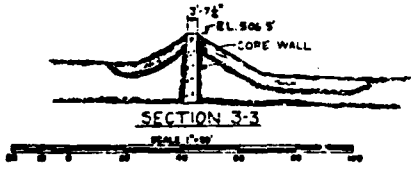
THIS BLUE PRINT IS A COPY OF THE APP
FOR LICENSE MADE BY THE UNDERSIG
THIS 15TH DAY OF APRIL, 1970
NIAGARA MOHAWK POWER CORPOR
BY D P Dix
TITLE

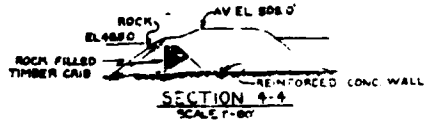
NIAGARA MOHAWK POWER CORPOR. SYRACUSE, N. Y.
CONSTRUCTED EAST CANADA CREEK PROJEC
BEARDSLEE DEVELOPMENT
GENERAL PLAN AND PROFILE
EXHIBIT I SHEET

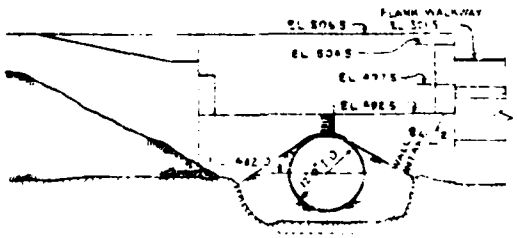
FIGURE 2







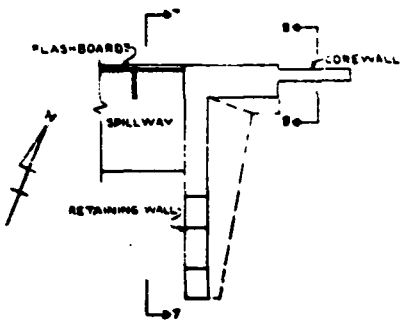




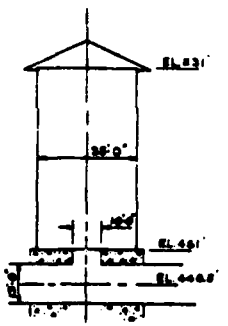
THIS REVISED DRAWING IS A PART OF THE APPLICATION FOR LICENSE MADE BY THE UNDERSIGNED THIS 13TH DAY OF APRIL, 1979
NIAGARA MOHAWK POWER CORPORATION
BY
TITLE

NIAGARA MOHAWK POWER CORPORATION
CONSTRUCTED EAST CANADA CREEK PROJECT
BEARDSLEE DEVELOPMENT
PLAN AND ELEVATION OF DAM AND SPILLWAY
EXHIBIT L
SCALE 1"= 80'

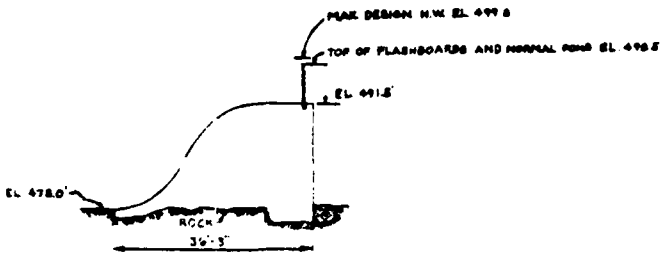
FIGURE 3



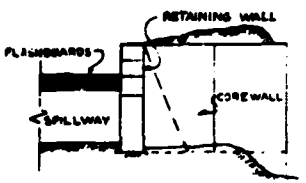
PLAN OF RETAINING WALL
SCALE 1"=20'-0"



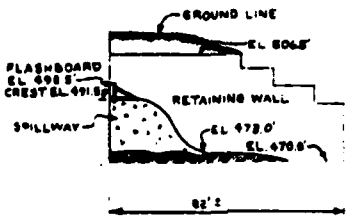
SECTION OF SURGE TANK
SCALE 1"=20'-0"



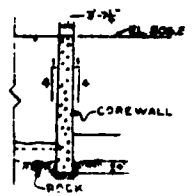
SPILLWAY
TYPICAL SECTION
SCALE 1"=10'-0"



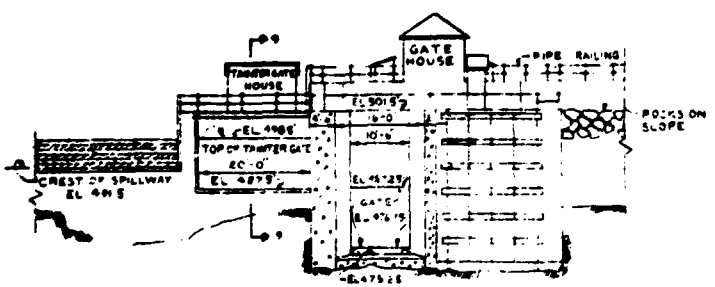
ELEVATION OF RETAINING WALL
SCALE 1"=20'-0"



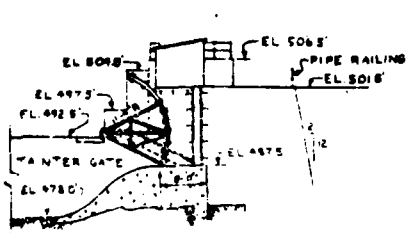
SECTION 7-7
SCALE 1"=20'-0"



SECTION 8-8
SCALE 1"=20'-0"



ELEVATION OF TAINTER GATE & PIPELINE INTAKE
SCALE 1"=10'-0"



SECTION 9-9
SCALE 1"=10'-0"

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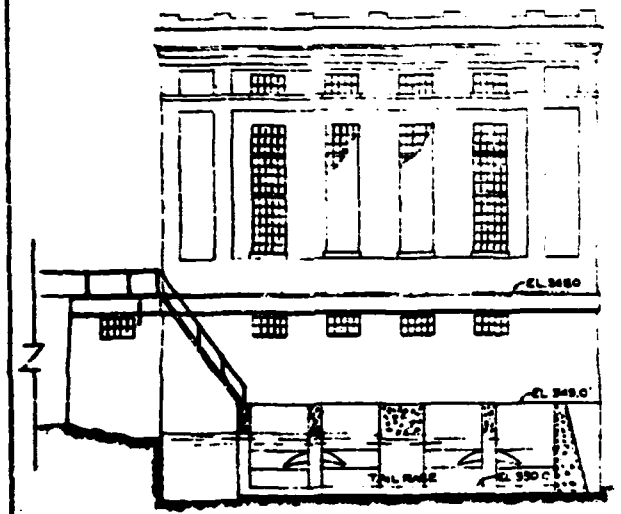
FOR LICENSE ISSUED BY THE UNDERSI
THIS 13TH DAY OF APRIL, 197
NIAGARA MOHAWK POWER CORP
BY
TITLE

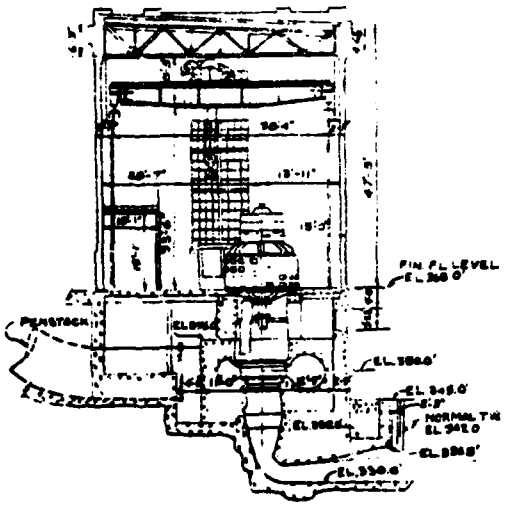
NIAGARA MOHAWK POWER CORP. FILE NO.
CONSTRUCTED EAST CANADA CREEK PROJ
BEARDSLEE DEVELOPMENT
PLAN AND DETAILS OF INTAKE

EXHIBIT L SCALE 1"=20' SHEET

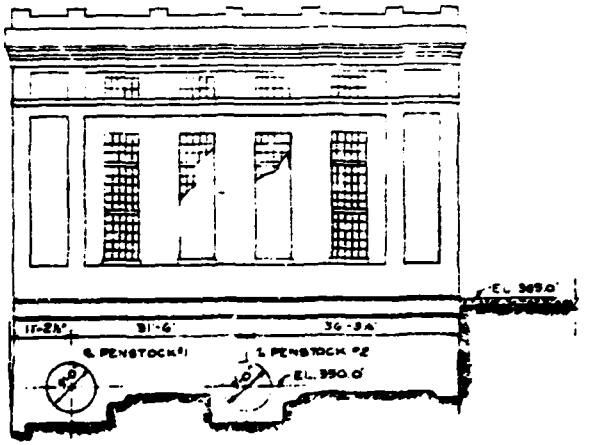
FIGURE 4



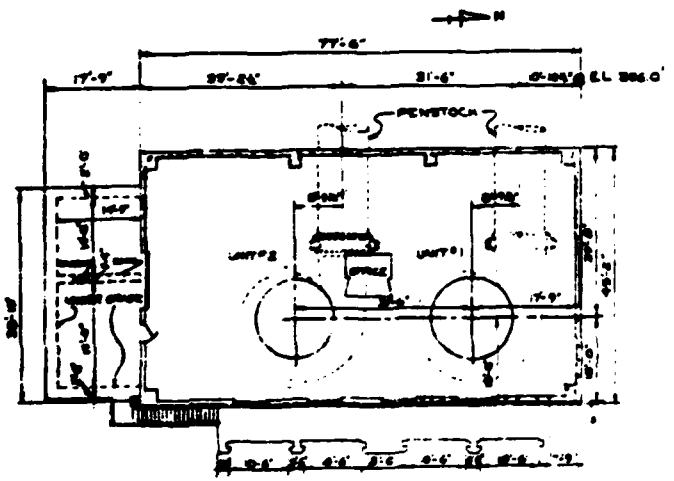
EAST ELEVATION



TYPICAL SECTION



WEST ELEVATION



POWER HOUSE PLAN

SOUTH ELEVATION

THIS PRINTED DRAWING IS A PART OF THE ATOMIC ENERGY ACT LICENSE ISSUED BY THE UNDERSIGNED THIS 15TH DAY OF APRIL, 1970
NIAGARA MOHAWK POWER CORPORATION
BY B. P. Bliss
TITLE

NIAGARA MOHAWK POWER CORPORATION
CONSTRUCTED EAST CANADA CREEK PROJECT
BEARDSLEE DEVELOPMENT
POWER HOUSE PLAN AND ELEVATIONS
EXHIBIT I SHEET NO. 1

FIGURE 5


FILMED
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